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## Yield Model Development

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CROP WEATHER MODELS OF CORN AND SOYBEANS FOR AGROPHYSICAL  
UNITS (APU's) IN IOWA USING MONTHLY METEOROLOGICAL PREDICTORS

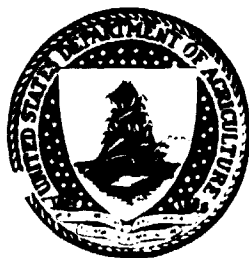
SHARON LEDUC

(E83-10054) CROP WEATHER MODELS OF CORN AND  
SOYBEANS FOR AGROPHYSICAL UNITS (APU's) IN  
IOWA USING MONTHLY METEOROLOGICAL PREDICTORS  
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Houston, Texas 77058

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16. Abstract  Models based on multiple regression were developed to estimate corn and soybean yield from weather data for Agrophysical Units (APU) in Iowa. The predictor variables are derived from monthly average temperature and monthly total precipitation data at meteorological stations in the cooperative network. The models are similar in form to the previous models developed for Crop Reporting Districts (CRD). The trends and derived variables were the same and the approach to select the significant predictors was similar to that used in developing the CRD models. The APU's were selected to be more homogeneous with respect crop to production than the CRDs. The APU models are quite similar to the CRD models, similar explained variation and number of predictor variables. The APU models will be independently evaluated and compared to the previously evaluated CRD models. That comparison will indicate the preferred model area for this application, i.e., APU or CRD.					
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CROP YIELD MODELS OF CORN AND SOYBEANS FOR  
AGROPHYSICAL UNITS (APU's) IN  
IOWA USING MONTHLY METEOROLOGICAL PREDICTORS

Sharon LeDuc

Introduction

Models were developed to investigate the hypothesis that prediction of yield from monthly weather parameters would improve if the basic area for the model became more homogeneous with respect to agricultural environment, soils and climate. The homogeneous areas, or agrophysical units (APU's), are groupings of counties. Models developed for APU's are compared with similar models previously developed for the crop reporting districts (CRD's). Eight APU's for Iowa, shown in Figure 1, were defined in a memorandum of understanding from Strommen and Dragg (January 10, 1980).

Data

The basic meteorological data were monthly average maximum and average minimum temperatures and total precipitation for all of the available cooperative stations. These data were used to estimate the monthly average temperature and monthly total precipitation for each county in the state. This task was completed at the University of Missouri - Columbia, Atmospheric Science Department, under the supervision of Professor Wayne Decker. The methods (Thiessen and inverse distance) were briefly described by LeDuc (1982). Since no significant difference in the values produced by the two methods was detected, the computationally simpler method, the inverse distance method was used. These county data were then averaged over all counties within each

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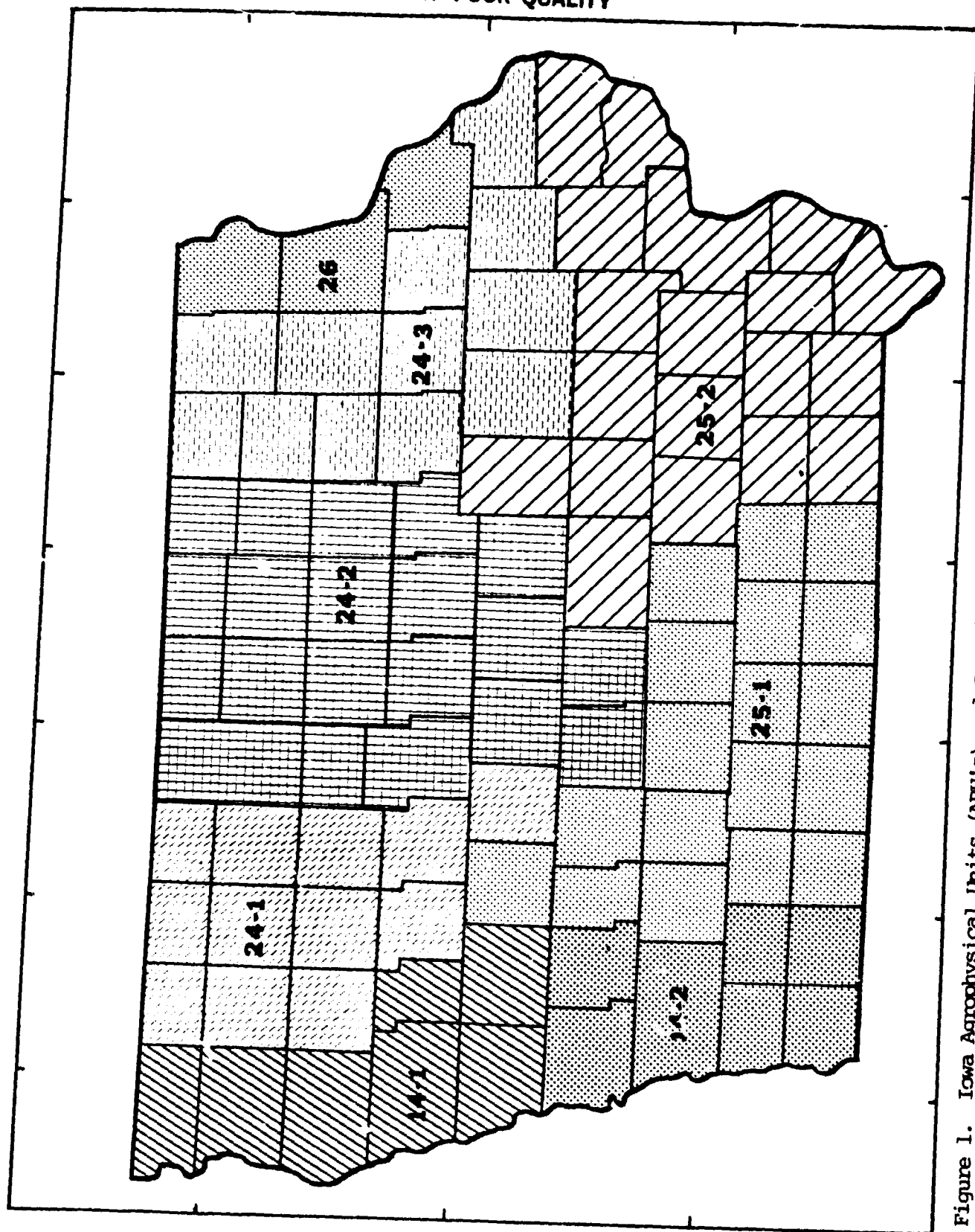


Figure 1. Iowa Agrophysical Units (APU's) and Counties

APU to obtain an average monthly temperature and total monthly precipitation for that APU.

Variables considered as predictor variables in the models are the same as those considered for the CRD's models (Motha, 1980; LeDuc, 1980). The trend variables are also the same. For the soybean models there are two linear trends; the change occurred in 1961. For the corn models there is a single linear trend.

### Method

The method for selecting variables was similar to that used for the previously developed CRD models. A preliminary correlation analysis was done between the yield with trend removed and the predictor variables. This was used to determine which variables to consider. Stepwise regression with stepwise, backward and forward selection was used. The selected variables were examined with respect to the sign of the coefficient, the agreement of variables selected for adjacent APU's and the statistical significance and correlation among the predictor variables. In some cases variables not selected in stepwise were considered for subjective reasons and the results analyzed. These additional variables were considered because they were important in adjacent APU's. If no variable was included for a month, including a period when weather might have had a significant affect on yield, several additional variables for that month were tried. These variables were not included in the models unless the coefficients were statistically significant in the full season model. This full season model is developed separately from the truncated models, i.e. models which used variables only through a specified month for each of the APU's.

### Discussion of the Models

The statistical details of each of the models are included in Appendix A. The truncated models, i.e., models using variables only through a specified month, for each of the APU's are included. There is also a separate model which incorporated observations from all of the separate APU's, cross sectional data. This increased the number of observations available to select the variables and to estimate the regression coefficients. In this model a dummy variable is considered for inclusion for each APU. This allows for a different level of yield for each APU, but assumes the same impact of the meteorological variables on yield in all APU's. The statistical summaries of the end of season models for soybeans and corn are included in Tables 1 and 2, respectively.

The production and harvested area data were available for counties (Cotter, 1981). For soybeans data were from 1950 through 1979. For corn, the data for "corn for grain" did not begin until 1956. Prior to that production and harvested area data were only available for "corn for grain." Kestle (1982) used a statistical adjustment to provide the yield of "corn for grain" from the yield of "corn for all purposes" for six years, 1950-1955. The statistical adjustment was based on 1956, the only year both sets of statistics were available. These data increased the sample size by 25 percent. The calculated yield was the sum of the production over all counties in each APU divided by the sum of the harvested area for those same counties. The observation for 1970 was not used to develop the corn models in some areas because of the devastating impact of the corn blight on yield.

### Development of the Models

The derived meteorological variables developed as potential predictors in the crop yield models are the same as those considered for the CRD models (Motha, 1980; LeDuc, 1980).

The variable PET (potential evapotranspiration) is calculated using Thornthwaite's method (1948).

The ET (evapotranspiration) and ETHAT (climatically appropriate evapotranspiration) are determined using a hydrologic accounting procedure developed by Palmer (1956). Software for calculating these variables is available for the Statistical Analysis System (SAS). Documentation and code for the software are available from Dr. Thomas Phillips at the Center for Environmental Assessment Services (CEAS). Restricting the variables considered as predictors was deliberate to allow evaluation of the difference in models (i.e. comparison Crop Reporting District (CRD, versus Agrophysical (APU) resulting from a change in the basic geographic unit for which yield was estimated. Other variables, such as monthly average maximum and minimum temperature were available for consideration in the models but were ignored when selecting variables for the models.

#### Models

The models are described in Tables in Appendix A. Figures displaying the yield and estimated yield from the model for the end of the season are included in Appendix B. Appendix C includes the data used in estimating the models.

#### Soybean Models

The soybean models (Appendix A) for the CRD's include variables for the weather in September in six of the nine CRD models, the southern, western and the north central models. September variables were included in models for 5 of the 8 APU's and also for the model which included all of the APU's.

The cumulative precipitation, the sum from September of the previous fall through April just prior to planting, was a variable in four of the CRD models. The coefficient was negative, indicating decreased yield is associated with too



much precipitation during that period. None of the APU models included this variable nor had April truncations. One of the APU models and the model for all APU's included the squared deviation from normal of the cumulative precipitation through May. The coefficient estimate was negative in both models.

Other variables for the month of May included in the APU models were precipitation and evapotranspiration. The CRD models used temperature and the squared precipitation. For the June truncation the APU models included variables which were functions of potential and/or estimated evapotranspiration. The CRD models used temperature in the June models. For both types of models, the July and August variables were largely functions of the evapotranspiration. August and September are important months in relating final yield to the weather. The variables included in the models are significant and explain much of the variability in the yields.

The explained variance ( $R^2$ ) for the final truncation of the soybean APU models ranged from 77-95 percent (77-98 percent for final CRD models). In the models which combined all APU's there were three APU's found to have a significantly lower level of yield (APU 141, 243 and 260) as indicated by the negative coefficients for variables D1, D4 and D5. The coefficients for the trend variables changed with the various models. The estimated increase due to trend is similar for both APU and CRD models. The estimated increase due to trend from 1950 to 1979 ranged from 7.4 q/ha in APU 251 in the south central to 13.4 q/ha in APU 260 in the northeast. Comparably, the range for the CRD models is from 7.4 q/ha for the southeast CRD to 13.5 q/ha for the northeast CRD.

#### Corn Models

The statistics for the truncated corn models for the APU's are included in Appendix A. The models for the full season model are summarized in Table 2.

There were only two APU models with a May truncation. One indicated that high temperatures in May were associated with decreased yields; the other that decreased yield is observed when May precipitation is high. July is the most important month in both the APU and the CRD models. The July variables for the APU models are functions of potential and/or estimated evapotranspiration.

June potential and/or estimated evapotranspiration also appears to be significant in many of the models. The end of the season model for APU 242 had a variable for April, the ratio of precipitation to potential evapotranspiration for April, and three models had variables for August.

The CRD models also had emphasis on the July variables. Cumulative precipitation for September through June was included as a squared deviation from the mean in three CRD models and in one APU model. One CRD model contains cumulative precipitation, September through June. An April truncation is not included for any of the CRD models and for only one APU model.

The explained variance ( $R^2$ ) is somewhat higher with the APU models (88-95 percent) than with CRD models (67-91 percent). The estimates of the trend coefficients appear to be higher with the CRD models although the differences are small. The increase in estimated yield due to trend ranges from 34.8 q/ha to 48.9 q/ha for the APU models for the period 1950 to 1980.

Three APU's (141, 142, 251) were found to have a significantly different level of yield as indicated by the significance of the coefficient of variable D1 in the model for all APU's.

### Summary

The variables of the APU models found to be significant for the APU models are closely related to those found to be significant for the CRD models, temperature or evapotranspiration was determined to be significant for the same month in the same geographic area. The functional form varied slightly as did the amount of variation explained. Structurally the models are similar by construction with differences being in the predictor variables selected. The estimated contribution due to trend is similar for the two types of models. The amount of variation explained by the APU models for corn was somewhat higher than for the CRD models. Selection between these two types of models will be made after the APU models have been independently tested. Differences between the statistics of the models (APU vs CRD) developed from historic data are not significant and do not determine a preference toward one type of selection of one geographical unit as the basis for models. Models for both types can be improved. The initial attempts can possibly be improved by evaluation of the trend through use of different linear trends or through incorporation of estimates of the components of technology, such as crop type and fertilizer application. The extent of this improvement will need to be determined in future model development. The evaluation of the current APU models and the comparison of the two types of models will be determined on the predictive capability since this is the intended use. The comparison of the regressions for the two types will be based on a bootstrap test procedure. Results will be presented in a later report.

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Table 1. Summary of Variables and Coefficient Estimates for APU Soybean Models (Final Truncation)

APU	R <sup>2</sup>	Trend		May		June		July		August		September		Dummy	
		1	2	Var.	Coef.	Var.	Coef.	Var.	Coef.	Var.	Coef.	Var.	Coef.	Var.	Coef.
141	.89	.18	.52			ET	.09	ET	.08						
142	.78	.29	.17	E	85.20	ETP	-32.34					E	3.35		
	.92	.39	.28	DSQ	-.00005			ET	.04	ET	.06	XDD	.58		
242	.92	.33	.35			ET	.09			ET	.03	PDSQ	-.00007		
243	.95	.33	.47			PET	.05			ET	.09	ETHAT	47.93		
251	.77	.33	.19	PDD	-.02	ET	.09			E	9.91				
252						ET	.06			E	4.84	ESQ	-.00002		
												XDD	56.83		
												ETHAT	-10.42		
260	.94	.34	.52			E	-30.46			ET	.06	XDD	61.21		
												E	5.63		
												ETHAT	-11.91		
All	.84	.33	.36	DSQ	-.00002	ET	.05	PD	.01	ET	.04	E	.03	D1	-.98
														D4	-1.16
														D5	-2.31

PDD, deviation from mean of monthly precipitation (mm);

ET, evapotranspiration (mm);

ETHAT, climatically appropriate evapotranspiration (mm);

E, ratio of ET to ETHAT;

PET, potential evapotranspiration (mm);

ETP, ratio of ET to PET;

DSQ, squared deviation from mean of cumulative precipitation since last September (mm<sup>2</sup>);

PDSQ, squared deviation from mean of precipitation (mm<sup>2</sup>);

XDD, deviation from mean of temperature (°C);

TREND1, year minus 1930 prior to 1962, then 32;

TREND2, .1 prior to 1962, then year minus 1961;

D1 (D4, D5), zero for all APU's except 141 (2 + 3, 260), when value is one, respectively.

Table 2. Summary of Variables and Coefficient Estimates for APU Corn Models (Final Truncation)

APU	R <sup>2</sup>	Trend	April		May		June		July		August		Dummy	
			Var.	Coef.	Var.	Coef.	Var.	Coef.	Var.	Coef.	Var.	Coef.	Var.	Coef.
141	.88	1.41							E	62.20				
142	.90	1.18							DEF	.05				
241	.93	1.57			XDD	-1.39	ET	.36	ETP	89.19	PD	-0.05		
									DEF	.08	E	19.12		
242	.95	1.63	MR	-1.34			XDD	.95	ETP	103.96	XDD	1.41		
243	.94	1.38					ET	.20	ETP	78.69	PD	.03		
251	.89	1.16					ET	.41	DEF	.07				
252	.94	1.46					RSQ	-.00009	E	51.47				
							ETHAT	.21						
260	.95	1.42			PD	-.05	ET	.20	E	57.85				
									MR	5.13				
All	.86	1.41					ET	.20	ETP	56.70	DI	-2.95		

DEF, precipitation minus potential evapotranspiration (mm);  
 RSQ, squared deviation from mean of cumulative precipitation since last September (mm);  
 E, ratio of ET to ETHAT;  
 ET, evapotranspiration (mm);  
 ETHAT, climatically appropriate evapotranspiration (mm);  
 ETP, ratio of ET to PET;  
 MR, precipitation divided by PET;  
 PD, precipitation (mm);  
 XDD, temperature deviation from mean (°C);  
 DI, zero for all APU's except 141, 142, or 251 when it is one.

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Appendix A

VARIABLE LABELS

TREND1 - YEAR-1930 IF YEAR<1952 OR 32 IF YEAR>1951  
TREND2 - 0.1 IF YEAR<1962 OR YEAR-1961 IF YEAR>1961  
E5 - ET/ETHAT FOR MAY  
DSQ5 - SQUARED CUM PRECIP DEVIATION FOR MAY  
P005 - PRECIP DEVIATION FOR MAY  
E6 - ET/ETHAT FOR JUNE  
ETP5 - ET/PET FOR JUNE  
PET6 - POTENTIAL EVAPOTRANSPIRATION FOR JUNE  
ET7 - EVAPOTRANSPIRATION FOR JULY  
PD7 - PRECIP FOR JULY  
ET8 - EVAPOTRANSPIRATION FOR AUGUST  
E8 - ET/ETHAT FOR AUGUST  
E9 - ET/ETHAT FOR SEPTEMBER  
PDSQ9 - SQUARED PRECIP DEVIATION FOR SEPTEMBER  
ETP9 - ET/PET FOR SEPTEMBER  
ETHAT9 - CLIMATICALLY APPROPRIATE POTENTIAL  
EVAPOTRANSPIRATION FOR SEPTEMBER  
DSQ9 - SQUARED CUM PRECIP DEVIATION FOR SEPTEMBER  
XDD9 - TEMPERATURE DEVIATION FOR SEPTEMBER  
ET9 - EVAPOTRANSPIRATION FOR SEPTEMBER  
D1 - 1 IF APU=141  
D4 - 1 IF APU=243  
D5 - 1 IF APU=260

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IOWA SOYBEANS NORTHWESTERN APU 141

MODEL: TREND                      SSE    145.523915              F RATIO              29.07  
DEP VAR: YIELD                      DFE              23              PRODF              0.0001  
   MSE              6.62633              R-SQUARE              0.6749

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	8.366214	4.234571	2.0937	0.0455
TREND1	1	0.229144	0.153774	1.4961	0.1474
TREND2	1	0.451737	0.091159	4.9549	0.0001

MODEL: JULY                      SSE    192.194459              F RATIO              41.26  
DEP VAR: YIELD                      DFE              27              PRODF              0.0001  
   MSE              3.78498              R-SQUARE              0.6209

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-10.103189	5.155265	-1.9534	0.0505
TREND1	1	0.206785	0.116317	1.7777	0.0867
TREND2	1	0.431990	0.069205	6.2645	0.0001
ET7	1	0.144093	0.030709	4.6922	0.0001

MODEL: AUGUST                      SSE    64.651310              F RATIO              50.88  
DEP VAR: YIELD                      DFE              29              PRODF              0.0001  
   MSE              2.486559              R-SQUARE              0.8367

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-11.240329	4.149552	-2.6829	0.0125
TREND1	1	0.205390	0.094281	2.1838	0.0382
TREND2	1	0.432965	0.056895	7.6098	0.0001
ET7	1	0.092773	0.028178	3.2924	0.0029
ET8	1	0.073542	0.018927	3.8855	0.0006



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IOWA SOYBEANS SOUTHWESTERN APU 142

MODEL: TREND                      SSE    127.230233                      F RATIO                      30.34  
DEP VAR: YIELD                      DFE                      25                      PROB>F                      0.0001  
   MSE    4.543437                      R-SQUARE                      0.5346

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	4.232443	3.506784	1.2070	0.2375
TREND1	1	0.479544	0.127342	3.7540	0.0008
TREND2	1	0.229084	0.075495	3.0343	0.0052

MODEL: MAY                              SSE    109.236354                      F RATIO                      24.23  
DEP VAR: YIELD                      DFE                      27                      PROB>F                      0.0001  
   MSE    4.045791                      R-SQUARE                      0.7292

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-16.214575	10.244773	-1.5827	0.1251
TREND1	1	0.447453	0.121125	3.5941	0.0010
TREND2	1	0.224981	0.071247	3.1858	0.0036
E5	1	21.544967	10.197133	2.1089	0.0444

MODEL: JUNE                              SSE    86.333167                      F RATIO                      23.87  
DEP VAR: YIELD                      DFE                      26                      PROB>F                      0.0001  
   MSE    3.320506                      R-SQUARE                      0.7860

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-45.429305	14.604532	-3.1340	0.0042
TREND1	1	0.388159	0.112031	3.4644	0.0019
TREND2	1	0.178519	0.067121	2.6512	0.0132
E5	1	84.079124	25.554141	3.2902	0.0029
ETD6	1	-31.901868	12.147135	-2.6263	0.0143

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IOWA SOYBEANS NORTH-WESTERN CENTRAL ADU 241

MODEL:	TREND	SSE	131.208905	F RATIO	36.36
DEP VAR:	YIELD	DFF	28	PROB>F	0.0001
		MSE	4.686032	R-SQUARE	0.7220
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	8.901801	3.561193	2.4997	0.0186
TREND1	1	0.281754	0.129314	2.1788	0.0379
TREND2	1	0.393413	0.076570	5.1313	0.0001
-----					
MODEL:	MAY	SSE	115.540591	F RATIO	27.76
DEP VAR:	YIELD	DFF	27	PROB>F	0.0001
		MSE	4.279281	R-SQUARE	0.7552
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	8.008395	3.435007	2.3314	0.0274
TREND1	1	0.344363	0.127936	2.6938	0.0120
TREND2	1	0.358593	0.075493	4.7500	0.0001
OSQ5	1	-0.000083928	.00004386125	-1.9135	0.0663
-----					
MODEL:	JULY	SSE	82.698737	F RATIO	30.59
DEP VAR:	YIELD	DFF	25	PROB>F	0.0001
		MSE	3.180721	R-SQUARE	0.8248
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-4.154903	4.806111	-0.8645	0.3952
TREND1	1	0.345721	0.110213	3.1368	0.0042
TREND2	1	0.345467	0.065213	5.2980	0.0001
OSQ5	1	-0.0000684292	.00003812087	-1.7951	0.0843
ET7	1	0.090026	0.028017	3.2133	0.0035
-----					
MODEL:	AUGUST	SSE	52.647863	F RATIO	39.82
DEP VAR:	YIELD	DFF	23	PROB>F	0.0001
		MSE	2.105915	R-SQUARE	0.8984
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-7.157513	3.990634	-1.7936	0.0850
TREND1	1	0.350064	0.089586	3.9032	0.0006
TREND2	1	0.341470	0.053074	6.4339	0.0001
OSQ5	1	-0.0000675296	.00003101939	-2.1770	0.0391
ET7	1	0.051198	0.025307	2.0474	0.0513
ET8	1	0.073093	0.019349	3.7775	0.0009

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IOWA SOYBEANS NORTHWESTERN CENTRAL APU 241

MODEL: SEPT  
DEP VAR: YIELD

SSE 34.448269  
DFF 23  
MSE 1.497751

F RATIO 41.73  
PROB>F 0.0001  
R-SQUARE 0.9270

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-8.151966	3.414368	-2.3875	0.0256
TREND1	1	0.373889	0.077547	4.8214	0.0001
TREND2	1	0.298544	0.046427	6.4305	0.0001
OSQ5	1	-0.000434136	0.0002740155	-1.5843	0.0001
ET7	1	0.041727	0.021599	1.9230	0.0670
ET8	1	0.056087	0.018949	2.9755	0.0068
X009	1	0.598013	0.179157	3.3379	0.0029
E9	1	3.504807	1.734866	2.0202	0.0552

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IOWA SOYBEANS NORTHERN CENTRAL APU 242

MODEL:	TREND	SSE	70.954573	F RATIO	63.21
DEP VAR:	YIELD	DFF	28	PROB>F	0.0001
		MSE	2.534095	R-SQUARE	0.8187
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	7.224666	2.618912	2.7588	0.0101
TREND1	1	0.356923	0.095097	3.7533	0.0008
TREND2	1	0.338749	0.056381	6.0082	0.0001

MODEL:	JUNE	SSE	57.756527	F RATIO	51.98
DEP VAR:	YIELD	DFF	27	PROB>F	0.0001
		MSE	2.139134	R-SQUARE	0.8524
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-0.454469	3.917520	-0.1160	0.9085
TREND1	1	0.354560	0.087377	4.0578	0.0004
TREND2	1	0.342606	0.051825	6.6109	0.0001
ET6	1	0.062361	0.025106	2.4839	0.0195

MODEL:	AUGUST	SSE	37.715752	F RATIO	60.94
DEP VAR:	YIELD	DFF	26	PROB>F	0.0001
		MSE	1.450506	R-SQUARE	0.9036
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-8.699990	3.915147	-2.2221	0.0352
TREND1	1	0.323202	0.072447	4.4612	0.0001
TREND2	1	0.365831	0.043132	8.4817	0.0001
ET6	1	0.071913	0.020934	3.4521	0.0019
ET8	1	0.068417	0.018407	3.7169	0.0010

MODEL:	SEPT	SSE	27.246535	F RATIO	53.45
DEP VAR:	YIELD	DFF	24	PROB>F	0.0001
		MSE	1.135272	R-SQUARE	0.9304
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-11.670862	3.608922	-3.2340	0.0035
TREND1	1	0.324175	0.066006	4.9113	0.0001
TREND2	1	0.367668	0.038335	9.5409	0.0001
ET6	1	0.086894	0.019120	4.5446	0.0001
ET8	1	0.036364	0.019946	1.8323	0.0793
PDS09	1	-0.000603855	0.0002969343	-2.0336	0.0532
ET09	1	5.450705	2.075977	2.6256	0.0148

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IOWA SOYBEANS NORTH-EASTERN CENTRAL APU 243

MODEL: TREND                      SSE      64.630002              F RATIO              97.94  
DEP VAR: YIELD                      DFF              25              PROB>F              0.0001  
   MSE      2.308214              R-SQUARE              0.9749

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	5.421748	2.499372	2.1692	0.0387
TREND1	1	0.351425	0.090750	3.8720	0.0006
TREND2	1	0.439387	0.053510	8.1749	0.0001

MODEL: JUNE                      SSE      55.648147              F RATIO              74.58  
DEP VAR: YIELD                      DFF              27              PROB>F              0.0001  
   MSE      2.061139              R-SQUARE              0.8923

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-1.648753	4.129179	-0.3993	0.6928
TREND1	1	0.353388	0.085327	4.1757	0.0003
TREND2	1	0.430524	0.051144	8.4343	0.0001
PET6	1	0.055324	0.026741	2.0875	0.0464

MODEL: AUGUST                      SSE      35.808185              F RATIO              37.30  
DEP VAR: YIELD                      DFF              25              PROB>F              0.0001  
   MSE      1.377255              R-SQUARE              0.9307

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-11.614538	4.277152	-2.7165	0.0116
TREND1	1	0.328467	0.070563	4.6201	0.0001
TREND2	1	0.456312	0.042275	10.7935	0.0001
PET6	1	0.063230	0.021147	2.9811	0.0078
ETA	1	0.045597	0.022553	2.0214	0.0008

MODEL: SEPT                      SSE      23.454332              F RATIO              94.13  
DEP VAR: YIELD                      DFF              24              PROB>F              0.0001  
   MSE      0.977264              R-SQUARE              0.9545

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	680.474564	250.078144	2.7211	0.0114
TREND1	1	0.327891	0.060555	5.4058	0.0001
TREND2	1	0.473077	0.038199	12.3845	0.0001
PET6	1	0.048580	0.019250	2.5283	0.0164
ETA	1	0.048424	0.019255	2.5253	0.0164
KDD9	1	44.941264	17.452129	2.5719	0.0104
ETHAT9	1	-9.729354	3.522549	-2.7621	0.0104

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IOWA SOYBEANS SOUTHERN CENTRAL APU 251

MODEL: TREND                      SSE      108.048518              F RATIO              22.76  
DEP VAR: YIELD                      DFE              28              PROB>F              0.0001  
   MSE      3.858979              R-SQUARE              0.6192

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	8.580604	3.231643	2.6552	0.0129
TREND1	1	0.288593	0.117351	2.4592	0.0204
TREND2	1	0.237713	0.069575	3.4167	0.0020

MODEL: MAY                              SSE      106.045039              F RATIO              15.08  
DEP VAR: YIELD                      DFE              27              PROB>F              0.0001  
   MSE      3.927594              R-SQUARE              0.6262

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	8.395031	3.270526	2.5668	0.0161
TREND1	1	0.296820	0.118950	2.4953	0.0190
TREND2	1	0.229958	0.071027	3.2376	0.0032
PD05	1	-0.00673008	0.009422912	-0.7142	0.4812

MODEL: JUNE                              SSE      92.122438              F RATIO              13.52  
DEP VAR: YIELD                      DFE              25              PROB>F              0.0001  
   MSE      3.543171              R-SQUARE              0.6753

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	0.932164	4.880952	0.1910	0.8500
TREND1	1	0.308481	0.113132	2.7267	0.0113
TREND2	1	0.223226	0.067546	3.3048	0.0028
PD05	1	-0.00824873	0.008982529	-0.9183	0.3569
ET6	1	0.057518	0.029016	1.9823	0.0581

MODEL: AUGUST                              SSE      60.693266              F RATIO              18.37  
DEP VAR: YIELD                      DFE              23              PROB>F              0.0001  
   MSE      2.427731              R-SQUARE              0.7861

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-13.070348	5.609725	-2.3299	0.0282
TREND1	1	0.322396	0.093726	3.4398	0.0021
TREND2	1	0.204107	0.056164	3.6341	0.0013
PD05	1	-0.019557	0.008072323	-2.4227	0.0230
ET6	1	0.086143	0.025302	3.4046	0.0023
EB	1	10.118020	2.812091	3.5940	0.0014

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IOWA SOYBEANS SOUTHEASTERN APU 252

MODEL: TREND                      SSE      89.427939              F RATIO              47.33  
DEP VAR: YIELD                      DFE              28              PROB>F              0.0001  
   MSE      3.193555              R-SQUARE              0.7717

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	11.113158	2.940021	3.7800	0.0008
TREND1	1	0.236766	0.106781	2.2177	0.0349
TREND2	1	0.384410	0.063296	5.0732	0.0001

MODEL: JUNE                      SSE      79.821775              F RATIO              35.17  
DEP VAR: YIELD                      DFE              27              PROB>F              0.0001  
   MSE      2.956362              R-SQUARE              0.7963

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	4.109556	4.805591	0.8551	0.4000
TREND1	1	0.253519	0.103135	2.4581	0.0207
TREND2	1	0.372398	0.061261	5.0789	0.0001
ET6	1	0.051996	0.028945	1.8026	0.0926

MODEL: AUGUST                      SSE      69.651056              F RATIO              30.06  
DEP VAR: YIELD                      DFE              26              PROB>F              0.0001  
   MSE      2.678987              R-SQUARE              0.8222

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-2.734247	5.767523	-0.4741	0.6394
TREND1	1	0.259036	0.098215	2.6374	0.0139
TREND2	1	0.344679	0.060025	5.7422	0.0001
ET6	1	0.068373	0.028716	2.3810	0.0249
E8	1	4.784751	2.455519	1.9485	0.0522

MODEL: SEPT                      SSE      26.036296              F RATIO              46.15  
DEP VAR: YIELD                      DFE              23              PROB>F              0.0001  
   MSE      1.132013              R-SQUARE              0.9335

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	810.252357	186.026321	4.3556	0.0002
TREND1	1	0.244408	0.064569	3.7793	0.0010
TREND2	1	0.384775	0.040728	9.4475	0.0001
ET6	1	0.054720	0.019452	2.8074	0.0100
E8	1	4.944258	1.606127	3.0784	0.0053
DSQ9	1	-0.000021304	0.00000611358	-3.4836	0.0020
XDD9	1	57.792325	13.173379	4.3870	0.0002
ETHAT9	1	-10.602992	2.432430	-4.3590	0.0002

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IOWA SOYBEANS NORTHEASTERN APU 260

MODEL: TREND                      SSF      104.114379              F RATIO              75.97  
DEP VAR: YIELD                      DFE              25              PROB>F              0.0001  
   MSE              3.716549              R-SQUARE              0.9361

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	1.739341	3.172339	0.5484	0.5877
TREND1	1	0.427905	0.115197	3.7145	0.0009
TREND2	1	0.478471	0.068495	7.0056	0.0001

MODEL: JUNE                      SSF      43.895470              F RATIO              45.92  
DEP VAR: YIELD                      DFE              25              PROB>F              0.0001  
   MSE              3.226144              R-SQUARE              0.9360

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	23.173452	11.593717	1.9998	0.0562
TREND1	1	0.393458	0.103497	3.8244	0.0012
TREND2	1	0.433351	0.063473	7.0511	0.0001
E6	1	-25.754215	10.834725	-2.3759	0.0252
ET6	1	0.046037	0.034335	1.3403	0.1916

MODEL: AUGUST                      SSF      62.592570              F RATIO              49.04  
DEP VAR: YIELD                      DFE              25              PROB>F              0.0001  
   MSE              2.503703              R-SQUARE              0.9075

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	20.719245	10.247055	2.0220	0.0540
TREND1	1	0.374552	0.095754	3.9135	0.0005
TREND2	1	0.495352	0.056253	8.8164	0.0001
E6	1	-33.163543	9.480414	-3.4965	0.0025
ET6	1	0.057293	0.030490	1.8781	0.0714
ET8	1	0.079264	0.027173	2.9149	0.0074

MODEL: SEPT                      SSF      33.365752              F RATIO              52.02  
DEP VAR: YIELD                      DFE              22              PROB>F              0.0001  
   MSE              1.544443              R-SQUARE              0.9498

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	922.938452	332.381421	2.7767	0.0110
TREND1	1	0.328134	0.077483	4.2565	0.0003
TREND2	1	0.532227	0.047424	11.2430	0.0001
E6	1	-29.509322	7.094478	-4.1707	0.0013
ET6	1	0.041524	0.024424	1.6932	0.1045
ET8	1	0.058481	0.023753	2.4610	0.0222
X009	1	25.333537	23.924855	1.0589	0.3012
E0	1	5.444159	2.319424	2.3465	0.0261
ETHAT9	1	-12.721555	4.689193	-2.7130	0.0127



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IOWA SOYBEANS STATE MODEL FOR ALL APUS IN STATE

MODEL: TREND	SSE	1032.304	F RATIO	136.28
DEP VAR: YIELD	DF	242	PROB>F	0.0001
	MSE	4.265718	R-SQUARE	0.7379

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	7.604698	1.205567	6.3080	0.0001
TREND1	1	0.331520	0.043522	7.5998	0.0001
TREND2	1	0.369184	0.025983	14.2748	0.0001
D1	1	-1.247751	0.406355	-3.0706	0.0024
D4	1	-1.159973	0.406355	-2.8546	0.0047
D5	1	-2.348986	0.406355	-5.7806	0.0001

MODEL: MAY	SSE	970.702365	F RATIO	122.82
DEP VAR: YIELD	DF	241	PROB>F	0.0001
	MSE	4.027911	R-SQUARE	0.7536

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	7.274524	1.174505	6.1937	0.0001
TREND1	1	0.355269	0.042521	8.2966	0.0001
TREND2	1	0.363373	0.025175	14.4339	0.0001
D1	1	-1.395621	0.396567	-3.5184	0.0005
D4	1	-1.176990	0.394985	-2.9806	0.0032
D5	1	-2.356031	0.394863	-5.9667	0.0001
DSQ5	1	-.0000238353	0.0000060948	-3.9108	0.0001

MODEL: JUNE	SSE	905.250269	F RATIO	114.90
DEP VAR: YIELD	DF	240	PROB>F	0.0001
	MSE	3.771876	R-SQUARE	0.7702

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	1.479321	1.796444	0.8235	0.4111
TREND1	1	0.354652	0.041438	8.5585	0.0001
TREND2	1	0.360990	0.024369	14.8136	0.0001
D1	1	-1.319412	0.384294	-3.4333	0.0007
D4	1	-1.058348	0.383193	-2.7619	0.0062
D5	1	-2.205112	0.383928	-5.7451	0.0001
DSQ5	1	-.0000207142	0.00000594538	-3.4841	0.0006
ET6	1	0.046284	0.011111	4.1657	0.0001

IOWA SOYBEANS STATE MODEL FOR ALL APUS IN STATE

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-7.805361	1.661313	-4.6983	0.0001
TREND1	1	0.326006	0.033089	9.8524	0.0001
TREND2	1	0.368393	0.019450	18.9408	0.0001
O1	1	-0.070538	0.031010	-2.2349	0.0232
O4	1	-1.071661	0.305179	-3.5116	0.0005
O5	1	-2.187475	0.306033	-7.1478	0.0001
O5O5	1	-0.000024	0.000047	-0.5179	0.0001
O6	1	0.059073	0.000925	6.4934	0.0001
O6O7	1	0.011392	0.000234	4.8644	0.0001
O7O8	1	0.004505	0.000774	0.5813	0.0001
O8O9	1	0.025623	0.000916	2.7947	0.0056

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VARIABLE LABELS

TREND - 1 IF YEAR  $\leq$  1949 OR YEAR=1949 IF YEAR > 1949  
MR4 - PRECIPITATION/PET FOR APRIL  
POS - PRECIPITATION FOR MAY  
XDD5 - TEMPERATURE DEVIATION FOR MAY  
ETHAT6 - CLIMATICALLY APPROPRIATE POTENTIAL  
          EVAPOTRANSPIRATION FOR JUNE  
XDD6 - TEMPERATURE DEVIATION FOR JUNE  
DSQ6 - SQUARED PRECIPITATION DEVIATION FOR JUNE  
ET6 - EVAPOTRANSPIRATION FOR JUNE  
MR7 - PRECIPITATION/PET FOR JULY  
E7 - ET/ETHAT FOR JULY  
DEF7 - TEMPERATURE DEVIATION-PET FOR JULY  
ETP7 - ET/PET FOR JULY  
PDR - PRECIPITATION FOR AUGUST  
E8 - ET/ETHAT FOR AUGUST  
XDD8 - TEMPERATURE DEVIATION FOR AUGUST  
PDR - PRECIPITATION FOR AUGUST  
D1 - DUMMY VARIABLE. 1 IF APJ=141 OR APJ=142 OR APJ=251

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STATE OF IOWA  
JANUARY 1970

IOWA CORN NORTHWESTERN APR 141

MODEL:	TREND		SSE	2954.373	F-RATIO	48.58
DEP VAR:	YIELD		RFE	25	PROB>F	0.0001
			RSE	73.728307	R-SQUARE	0.6242
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T	
INTERCEPT	1	25.137471	3.151337	7.9744	0.0001	
TREND	1	1.141949	0.173327	6.5842	0.0001	
<hr/>						
MODEL:	JULY		SSE	645.759832	F-RATIO	89.75
DEP VAR:	YIELD		RFE	25	PROB>F	0.0001
			RSE	26.375347	R-SQUARE	0.6752
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T	
INTERCEPT	1	-35.017255	13.433181	-2.5314	0.0177	
TREND	1	1.405412	0.195305	12.9902	0.0001	
E7	1	62.197195	12.785409	4.8647	0.0001	
DEF7	1	0.050501	0.025700	1.9650	0.0502	

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IOWA CORN SOUTHWESTERN APR 142

MODEL: TREND                      SSE      2552.722              F-RATIO              40.24  
DEP VAR: YIELD                      DFE              25              PROB>F              0.0001  
   MSE      94.740151              R-SQUARE              0.5900

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	26.734000	3.582702	7.4773	0.0001
TREND	1	1.247112	0.196475	6.3473	0.0001

MODEL: JUNE                      SSE      2443.755              F-RATIO              22.24  
DEP VAR: YIELD                      DFE              27              PROB>F              0.0001  
   MSE      90.509501              R-SQUARE              0.5223

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	1.175175	17.217370	0.0683	0.9461
TREND	1	1.241170	0.192382	6.4517	0.0001
ETS	1	0.201755	0.132783	1.5194	0.1403

MODEL: JULY                      SSE      797.035145              F-RATIO              51.68  
DEP VAR: YIELD                      DFE              25              PROB>F              0.0001  
   MSE      30.655198              R-SQUARE              0.8758

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	-98.362753	16.877311	-5.8241	0.0001
TREND	1	1.295423	0.112635	11.5552	0.0001
ETS	1	0.307738	0.078512	3.9145	0.0005
ETD7	1	92.149720	12.572355	7.3242	0.0001

MODEL: AUGUST                      SSE      539.846440              F-RATIO              30.95  
DEP VAR: YIELD                      DFE              25              PROB>F              0.0001  
   MSE      25.593755              R-SQUARE              0.9011

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	-95.205382	15.473770	-6.1537	0.0001
TREND	1	1.184729	0.111754	10.5912	0.0001
ETS	1	0.325435	0.074515	4.3695	0.0001
ETD7	1	89.181227	11.551445	7.7219	0.0001
PD8	1	-0.045955	0.018748	-2.4752	0.0203

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1974 CORN NORTHWEST CENTRAL APR 2-1

MODEL: TREND                      SSE      1312.391              F-RATIO      123.30  
   DFE      25                      PROB>F      0.0001  
DEP VAR: YIELD                      SSE      46.571107              R-SQUARE      0.8149

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	25.535472	2.519475	10.13711	0.0001
TREND	1	1.234523	0.135193	11.1035	0.0001

MODEL: MAY                              SSE      1214.742              F-RATIO      55.04  
   DFE      27                      PROB>F      0.0001  
DEP VAR: YIELD                      SSE      45.145754              R-SQUARE      0.7251

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	25.395202	2.478759	10.2477	0.0001
TREND	1	1.546797	0.135399	11.3829	0.0001
XDD5	1	-1.026331	0.713350	-1.4347	0.1517

MODEL: JULY                              SSE      655.004609              F-RATIO      45.02  
   DFE      29                      PROB>F      0.0001  
DEP VAR: YIELD                      SSE      25.230447              R-SQUARE      0.9075

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	30.319186	2.030597	14.9290	0.0001
TREND	1	1.591743	0.102140	15.5805	0.0001
XDD5	1	-1.267412	0.535740	-2.3667	0.0257
DEF7	1	0.091478	0.019357	4.7235	0.0001

MODEL: AUGUST                              SSE      445.448202              F-RATIO      55.32  
   DFE      24                      PROB>F      0.0001  
DEP VAR: YIELD                      SSE      20.227505              R-SQUARE      0.9315

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	11.187912	7.153424	1.5630	0.1311
TREND	1	1.558775	1.092347	1.42512	0.0001
XDD5	1	-1.391542	0.449100	-3.0942	0.0009
DEF7	1	0.020445	0.011581	1.7676	0.0002
ER	1	19.121327	5.885487	3.2474	0.0105
XDD8	1	1.411204	0.754500	1.8693	0.0740

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OF POOR QUALITY

1014 CORN (NORTHERN CENTRAL) APR 242

MODEL: TREND                      SSE      1091.162              F-RATIO      147.92  
DEP VAR: YIELD                      DFE      25                      PROB>F      0.0001  
   MSE      37.622544                      R-SQUARE      0.9301

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	29.625375	2.257715	13.1220	0.0001
TREND	1	1.495015	0.123159	12.1523	0.0001

MODEL: APRIL                      SSE      1078.461              F-RATIO      72.37  
DEP VAR: YIELD                      DFE      25                      PROB>F      0.0001  
   MSE      35.534223                      R-SQUARE      0.9379

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	30.954215	3.292327	9.4019	0.0001
TREND	1	1.489257	0.125525	11.8543	0.0001
MP4	1	-0.550158	0.449394	-0.5504	0.5797

MODEL: JUNE                      SSE      1074.405              F-RATIO      45.73  
DEP VAR: YIELD                      DFE      27                      PROB>F      0.0001  
   MSE      39.811317                      R-SQUARE      0.8385

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	30.784114	3.333537	9.2344	0.0001
TREND	1	1.459078	0.127591	11.4615	0.0001
MP4	1	-0.475315	1.047735	-0.4507	0.6515
XDD6	1	0.263157	0.824195	0.3192	0.7521

MODEL: JULY                      SSE      307.841793              F-RATIO      134.05  
DEP VAR: YIELD                      DFE      25                      PROB>F      0.0001  
   MSE      11.840154                      R-SQUARE      0.9535

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	-54.903440	12.523115	-4.3825	0.0001
TREND	1	1.623505	0.071755	22.6243	0.0001
MP4	1	-1.335117	0.541225	-2.4684	0.0295
XDD6	1	0.957742	0.457507	2.0920	0.0474
ETP7	1	113.757172	12.915537	8.8044	0.0001



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DATA CERN NORTHEAST CENTRAL APR 243

MODEL: TREND      SSE 722.991139      F RATIO 191.59  
DEP VAR: YIELD      DFE 24      PROB>F 0.0001  
                         MSE 24.430755      C-SQUARE 0.8555

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	30.095105	1.837155	15.5751	0.0001
TREND	1	1.367799	0.100253	13.4415	0.0001

MODEL: JUNE      SSE 536.021154      F RATIO 107.05  
DEP VAR: YIELD      DFE 23      PROB>F 0.0001  
                         MSE 22.71535      C-SQUARE 0.5543

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	8.892817	10.975551	0.8102	0.4247
TREND	1	1.364549	0.095719	14.4542	0.0001
ET6	1	0.173530	0.088735	1.9557	0.0504

MODEL: JULY      SSE 409.395255      F RATIO 111.92  
DEP VAR: YIELD      DFE 27      PROB>F 0.0001  
                         MSE 15.159492      C-SQUARE 0.9256

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-59.440145	22.151527	-3.1347	0.0041
TREND	1	1.422102	0.079040	18.1503	0.0001
ET6	1	0.137139	0.072575	2.5752	0.0157
ETP7	1	79.305721	20.245542	3.8672	0.0005

MODEL: AUGUST      SSE 350.659727      F RATIO 95.44  
DEP VAR: YIELD      DFE 25      PROB>F 0.0001  
                         MSE 13.447297      C-SQUARE 0.9362

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-73.567152	20.987925	-3.5052	0.0017
TREND	1	1.321552	0.077947	17.7255	0.0001
ET6	1	0.200410	0.158750	2.5151	0.0072
ETP7	1	73.394395	19.100150	4.1211	0.0003
P08	1	0.025955	0.013557	2.5851	0.0470



100A CORN SOUTHERN CENTRAL A-00 251

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	25.023485	0.230206	108.303	0.0001
TREND	1	1.161353	0.177324	6.5504	0.0001

VARIABLE	OF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	-5.235543	15.244444	-0.3223	0.7497
TREND	1	1.156319	0.124669	9.3413	0.0001
ET6	1	0.251356	0.123323	2.0363	0.0364

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	-72.621151	17.235295	-4.2123	0.0003
TREND	1	1.151243	0.095755	11.7544	0.0001
ET6	1	0.405495	0.074527	5.3350	0.0001
OFF7	1	0.066705	0.014507	4.5930	0.0012
E7	1	51.453259	13.915591	3.6947	0.0011

YTLAUQ 3009 20

1174 C. P. J. van der Stoep, J. S. Stander and J. H. van der Merwe

MODEL: TREND	414.4333	145.33
DEF VAR: YIELD	36.252495	0.0001

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-VALUE	PROB> T
INTERCEPT	1	9.211274	6.113701	1.50515	0.0901
TREND	1	1.404354	6.113701	12.1911	0.0001

MODEL: JUNE	SSR	707.457.51	R-RATIO	02.32
	DF	23	DF-RATIO	0.0001
DEF VAR: YIELD	SSR	27.219366	R-SQUARED	0.9774

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-STAT	PROB> T
INTERCEPT	1	20.852657	11.355798	1.8381	0.0774
TREND	1	1.444937	0.1108472	13.0333	0.0001
DS36	1	-0.000745327	0.0003657348	-2.0381	0.0457
ETH4T6	1	0.000000000	0.000000000	0.0000	0.9999

MODEL: JULY	SS	345.119117	R-RATIO	95.69
	DF	25	R-SQ	0.0001
DEP VAR: YIELD	MS	13.804765	R-SQ ADJ	0.9404

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	-57.151214	17.243497	-3.3164	0.0024
TREND	1	1.454417	0.075751	19.3319	0.0001
DS96	1	-0.000504117	0.0002605779	-1.9348	0.0516
ETHAT6	1	0.212753	0.065594	3.1845	0.0034
E7	1	61.074154	11.021525	5.1232	0.0001

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1074 COR 1 NORTH-EASTERN, 420 200

MODEL: TREND	552	571.536700	F-RATIO	232.00
	DFE	29	24.375	0.0001
DEP VAR: YIELD	150	20.397320	R-SQUARED	0.6909

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	30.135324	1.552401	19.4244	0.0001
TREND	1	1.351343	0.049991	27.0346	0.0001

MODEL: MAY	SSR	557.196715	R-RATIO	119.33
	DFR	28	2004>F	0.0001
DEF VAR: YIELD	LSR	19.971515	R-SQUARE	0.9950

VARIABLE	OF	UNBIAIASED ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	33.091743	2.845751	11.2254	0.0001
TREND	1	1.359245	0.000253	12.1581	0.0001
POS	1	-0.027475	0.021393	-1.2725	0.2137

MODEL: JUNE	SSE	484.672750	F-RATIO	14.59
	DF	27	PROB>F	0.0001
DEP VAR: YIELD	MSR	17.950643	P-SQUARE	0.9090

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T RATIO	PROB> T
INTERCEPT	1	13.824533	9.235359	1.4952	0.1714
TREND	1	1.381957	0.953774	1.51012	0.0001
POSND	1	-0.033477	0.020353	-1.6183	0.1172
ET6	1	0.161782	0.079401	2.0375	0.0315

MODEL: JULY	SSR	274.695394	5-4-10	117.32
DEP VAR: YIELD	SSR	10.562207	5-4-10	0.0001
	SSR		5-4-10	0.4484

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	T-RATIO	PROB> T
INTERCEPT	1	-4.741433	10.433229	-3.0541	0.0051
TREND	1	1.424232	0.066314	21.4131	0.0001
PD5	1	-9.044430	0.015091	-3.9649	0.0000
ET6	1	0.191449	0.051410	3.1965	0.0035
ET7	1	37.047554	12.970705	4.4541	0.0001

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1974 CORN STATE MODEL FOR ALL APUS IN STATE

MODEL: TREND  
DEP VAR: YIELD  
SSE 14008.97  
DFE 240  
MSE 58.370715  
F-RATIO 315.69  
PROB>F 0.0001  
R-SQUARE 0.7248

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	F-RATIO	PROB> T
INTERCEPT	1	23.931394	1.011343	23.6912	0.0001
TREND	1	1.352129	0.054415	24.5479	0.0001
DT	1	-5.407938	1.489582	-3.6790	0.0003

MODEL: JUNE  
DEP VAR: YIELD  
SSE 13094.12  
DFE 234  
MSE 54.787399  
F-RATIO 229.79  
PROB>F 0.0001  
R-SQUARE 0.7426

VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	F-RATIO	PROB> T
INTERCEPT	1	7.869372	5.246773	1.4998	0.1350
TREND	1	1.347987	0.052729	25.3643	0.0001
DT	1	-5.339389	1.443757	-3.6995	0.0003
ETS	1	0.170236	0.041551	4.0842	0.0001

MODEL: JULY  
DEP VAR: YIELD  
SSE 7079.343  
DFE 237  
MSE 29.871910  
F-RATIO 293.14  
PROB>F 0.0001  
R-SQUARE 0.8508

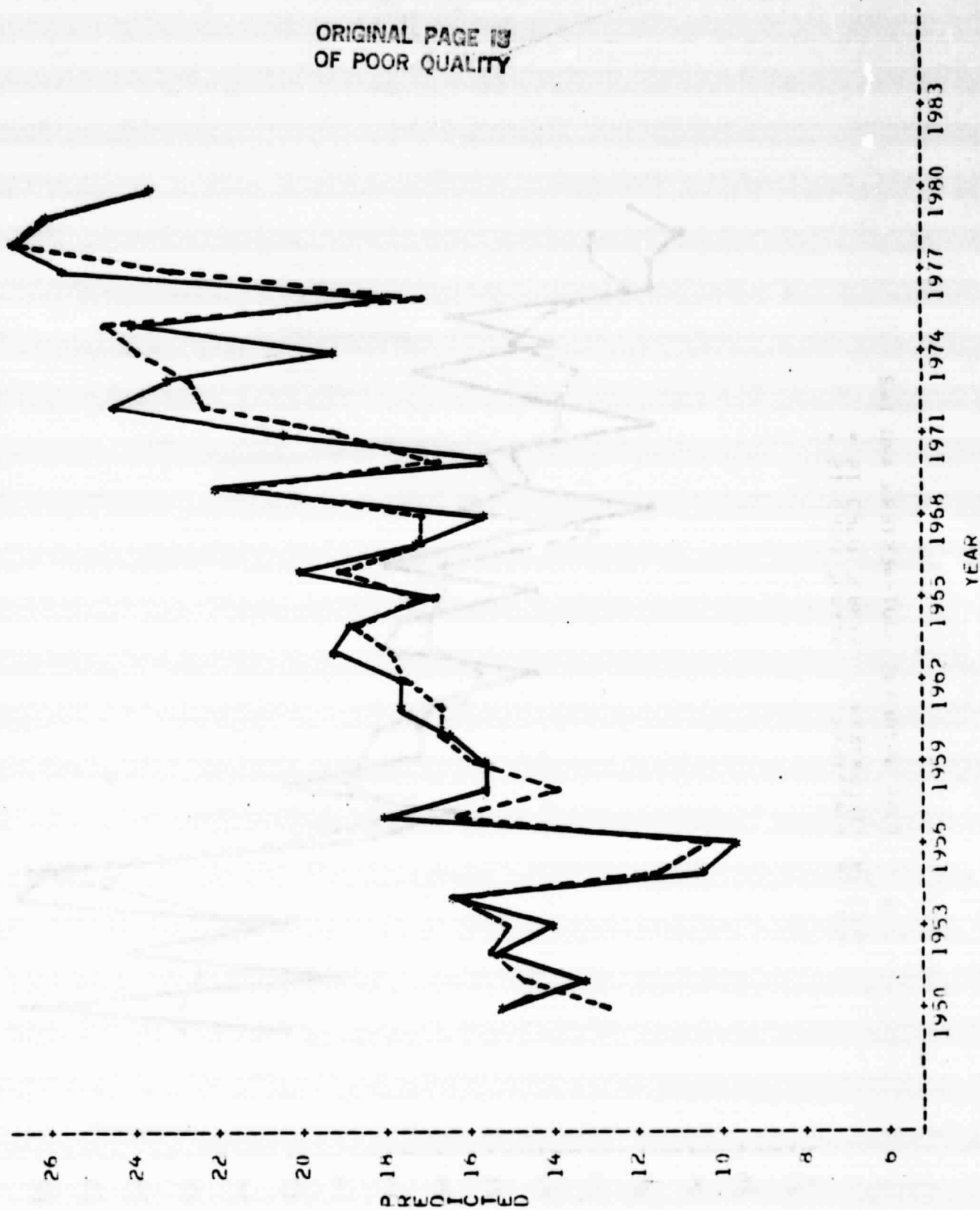
VARIABLE	DF	PARAMETER ESTIMATE	STANDARD ERROR	F-RATIO	PROB> T
INTERCEPT	1	-54.456058	0.542137	-4.3240	0.0001
TREND	1	1.414570	0.039253	35.8343	0.0001
DT	1	-2.755205	1.079390	-2.7378	0.0067
ETS	1	0.201507	0.032415	5.2100	0.0001
4-7	1	5.134723	1.279572	4.0125	0.0001
PROD	1	55.703590	5.625545	5.5543	0.0001

# Appendix B

1044 SOYBEANS NORTHWESTERN ARIJ 141

PLOT OF YIELD\*YEAR SYMBOL USED IS \*

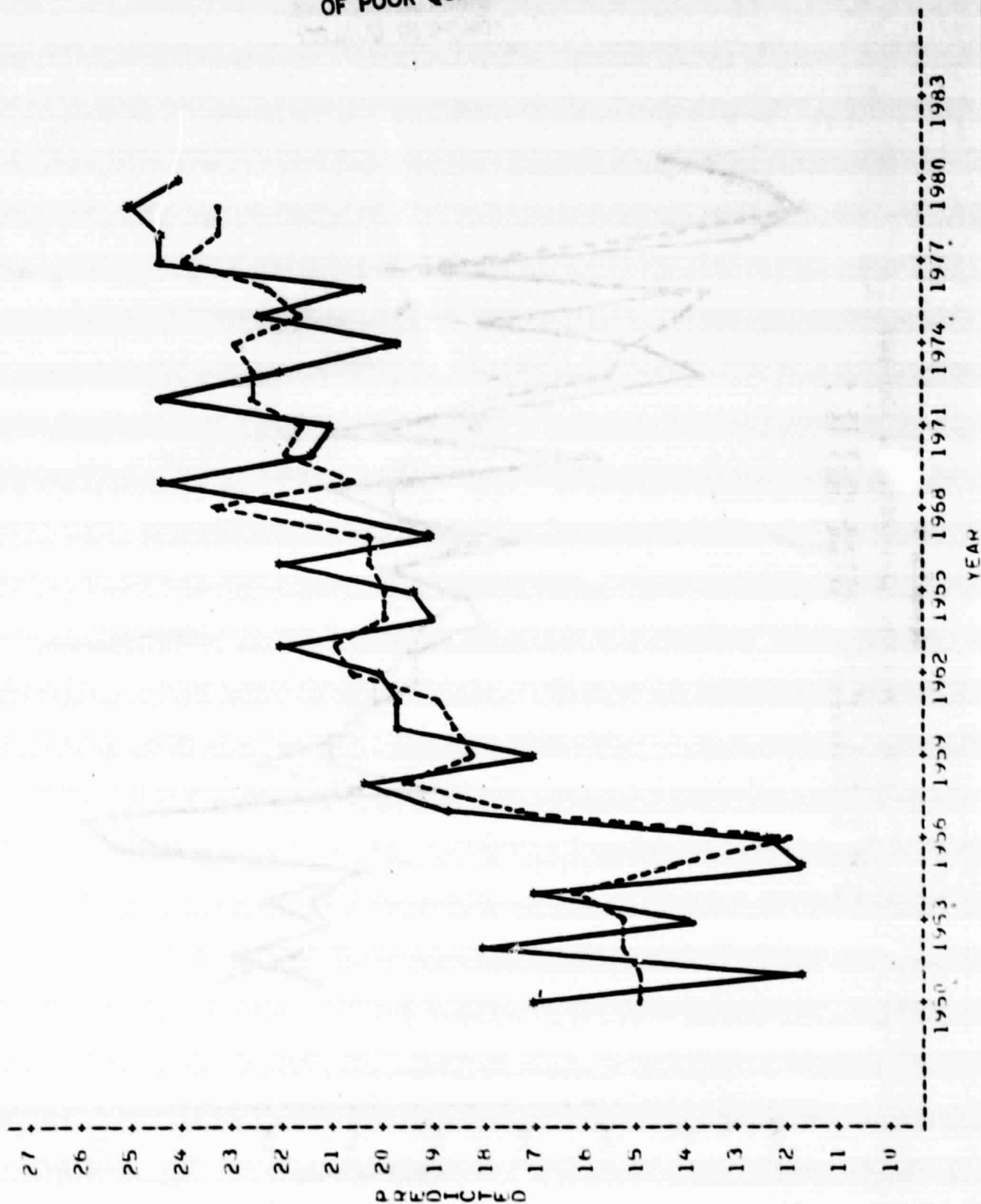
PLOT OF YIELD\*YEAR SYMBOL USED IS \*



IOWA SOYBEAN SOUTHWESTERN APR 142

PLOT OF YIELD\*YEAR SYMBOL USED IS #  
 PLOT OF YIAT\*YEAR SYMBOL USED IS .

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241

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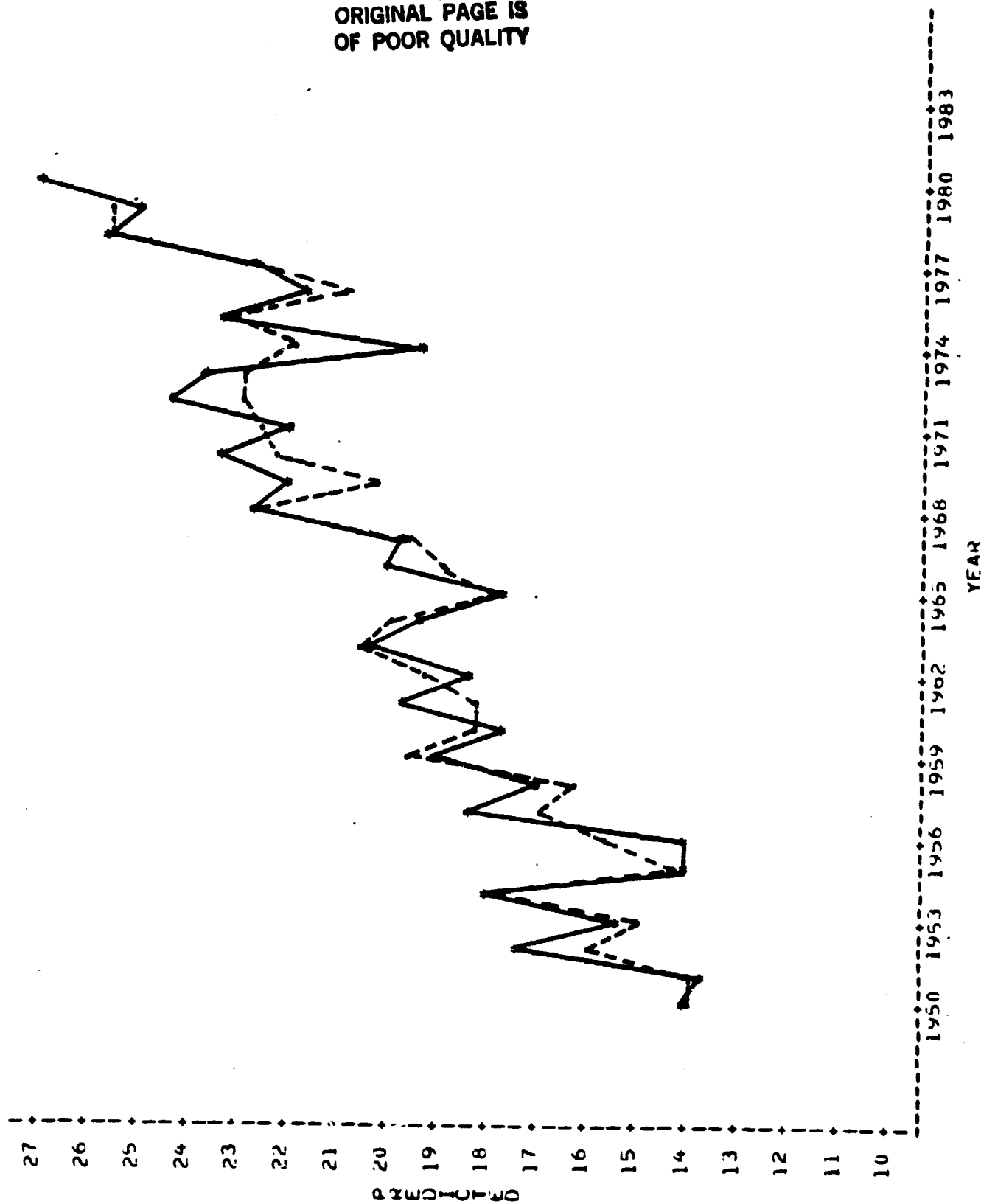
1950 1953 1956 1959 1962 1965 1968 1971 1974 1977 1980 1983

YEAR

IOWA SOYBEANS NORTHERN CENTRAL APU 242

PLOT OF YIELD\*YEAR      SYMBOL USED IS \*  
 PLOT OF YIELD\*YEAR      SYMBOL USED IS .

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 OF POOR QUALITY



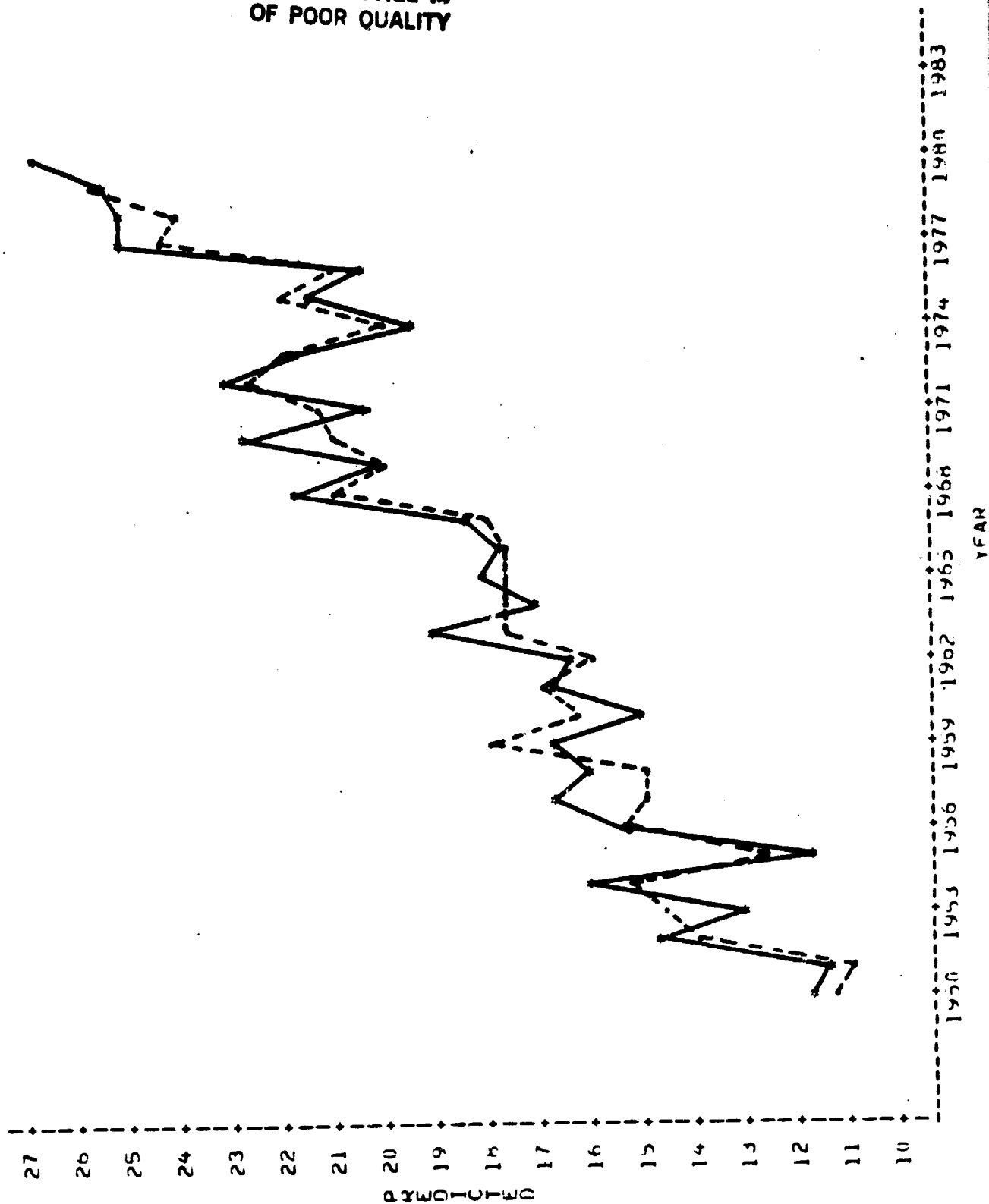


# IOWA SOYBEANS NORTH-EASTERN CENTRAL APIJ 243

PLOT OF YIELD\*YEAR SYMBOL USED IS \*

PLOT OF Y-AT\*YEAR SYMBOL USED IS :

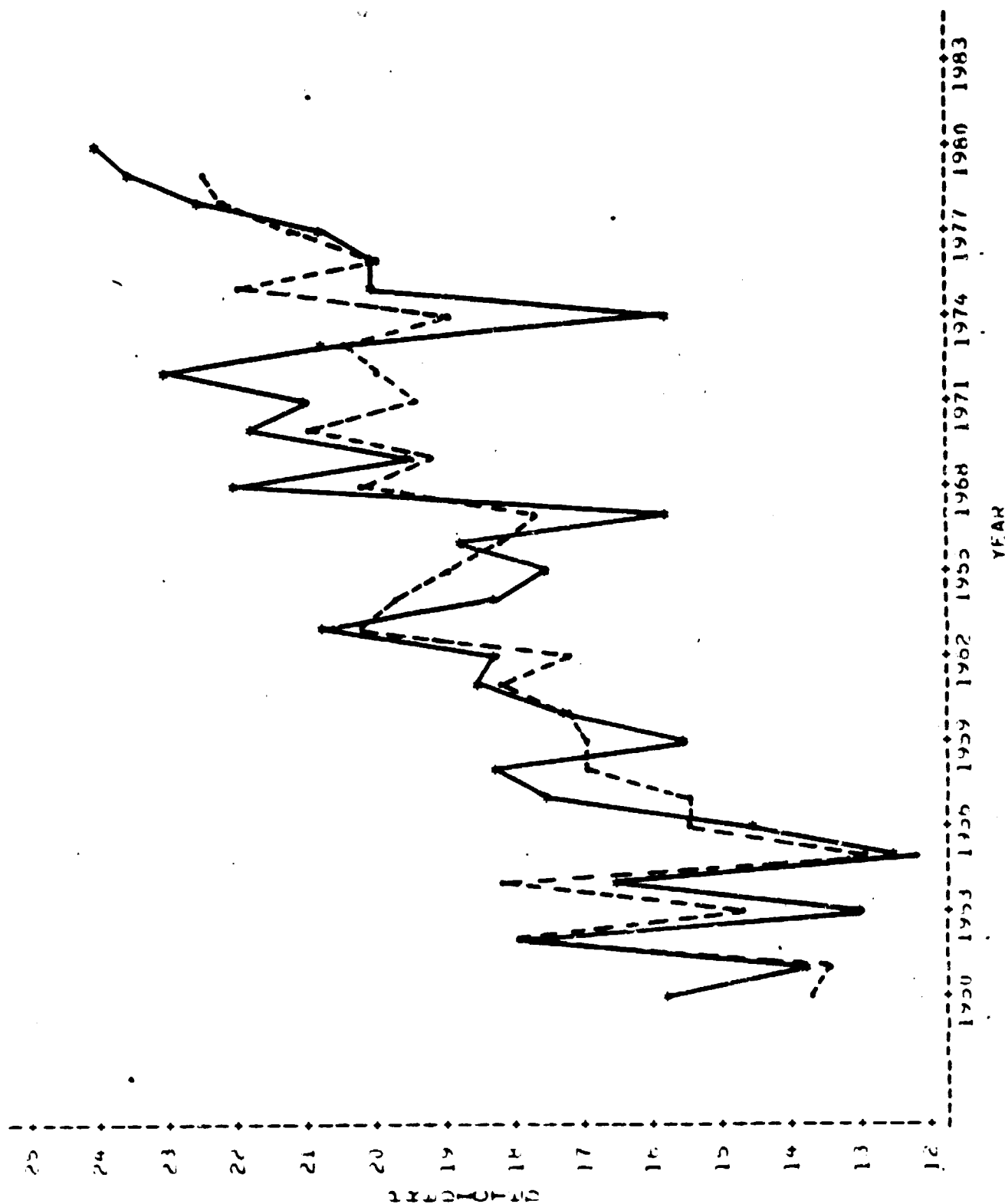
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# IOWA SOYBEANS SOUTHEASTERN CENTRAL APU 251

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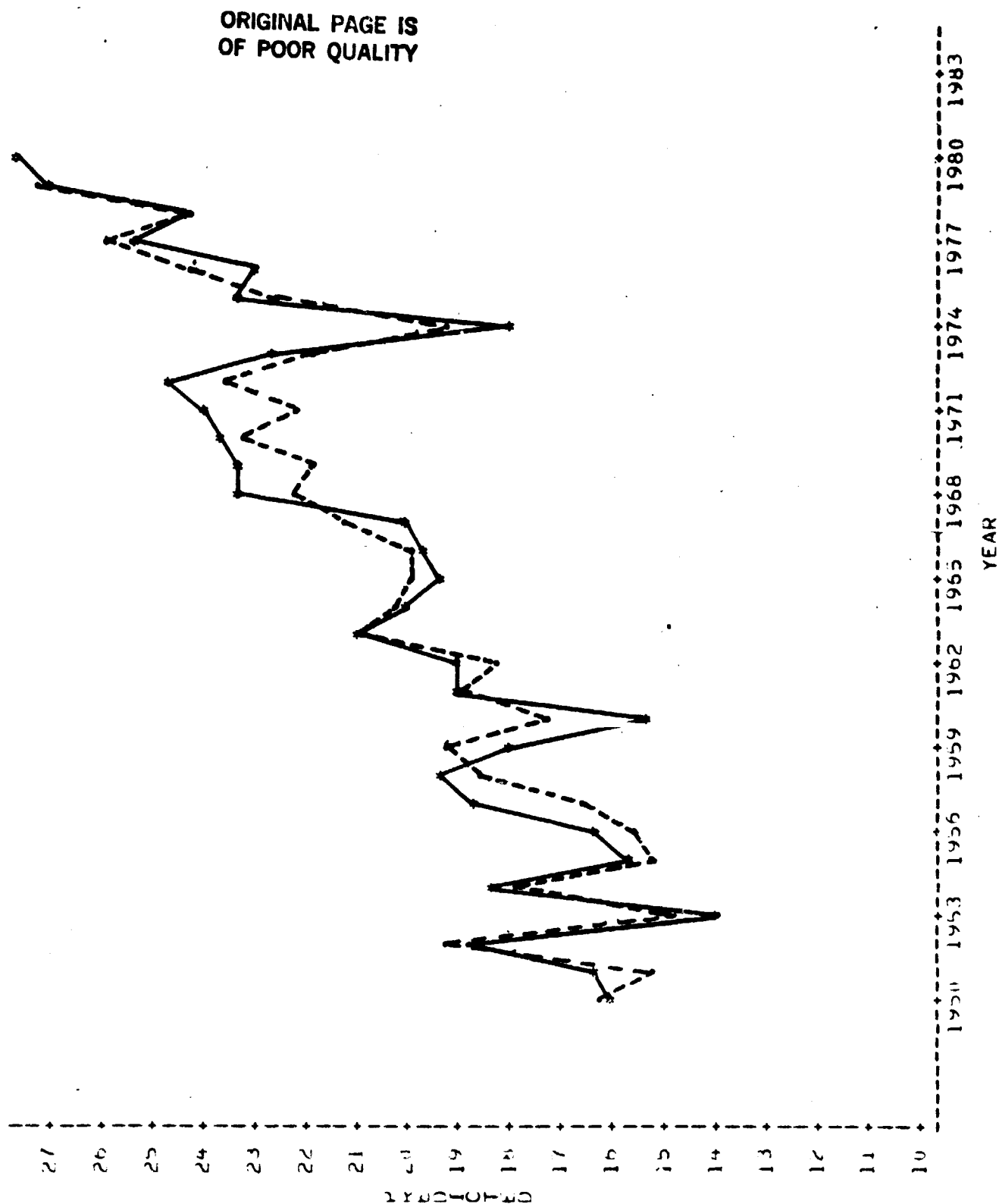
PLOT OF YIELD\*YEAR SYMBOL USED IS \*



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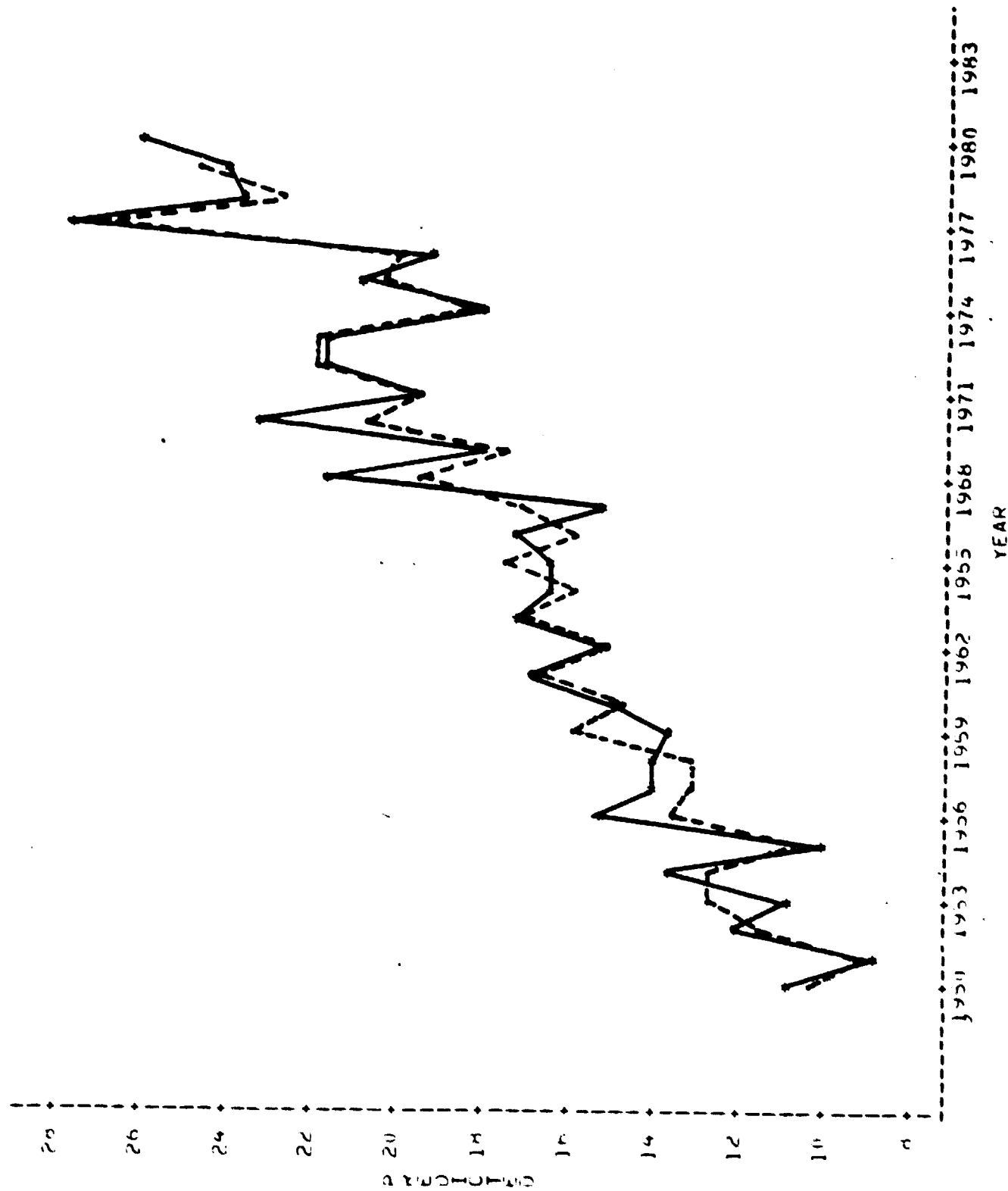
# IOWA SOYBEANS SOUTHEASTERN APU 252

PLOT OF YIELD\*YEAR  
 PLOT OF YHAT\*YEAR



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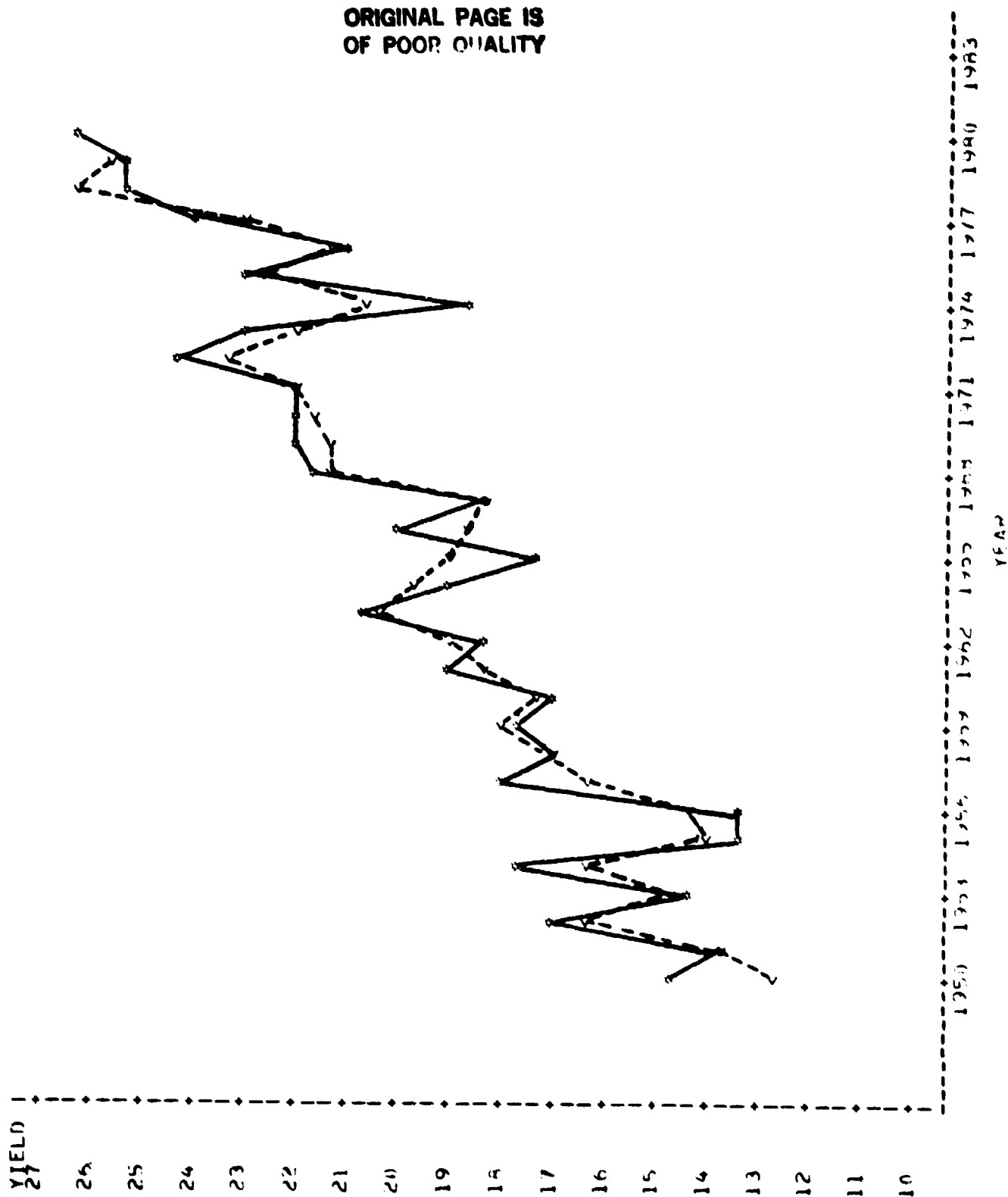
114A SOYBEANS NORTHEASTERN APU 260  
PLOT OF YIELD\*YEAR SYMBOL USED IS \*  
PLOT OF YIELD\*YEAR SYMBOL USED IS :



1974 SOYBEAN STATE ADEQUACY FOR ALL AREAS IN STATE

PLOT OF YIELD/ACRE SYMBOL USED IS \*

PLOT OF YIELD/ACRE SYMBOL USED IS \*

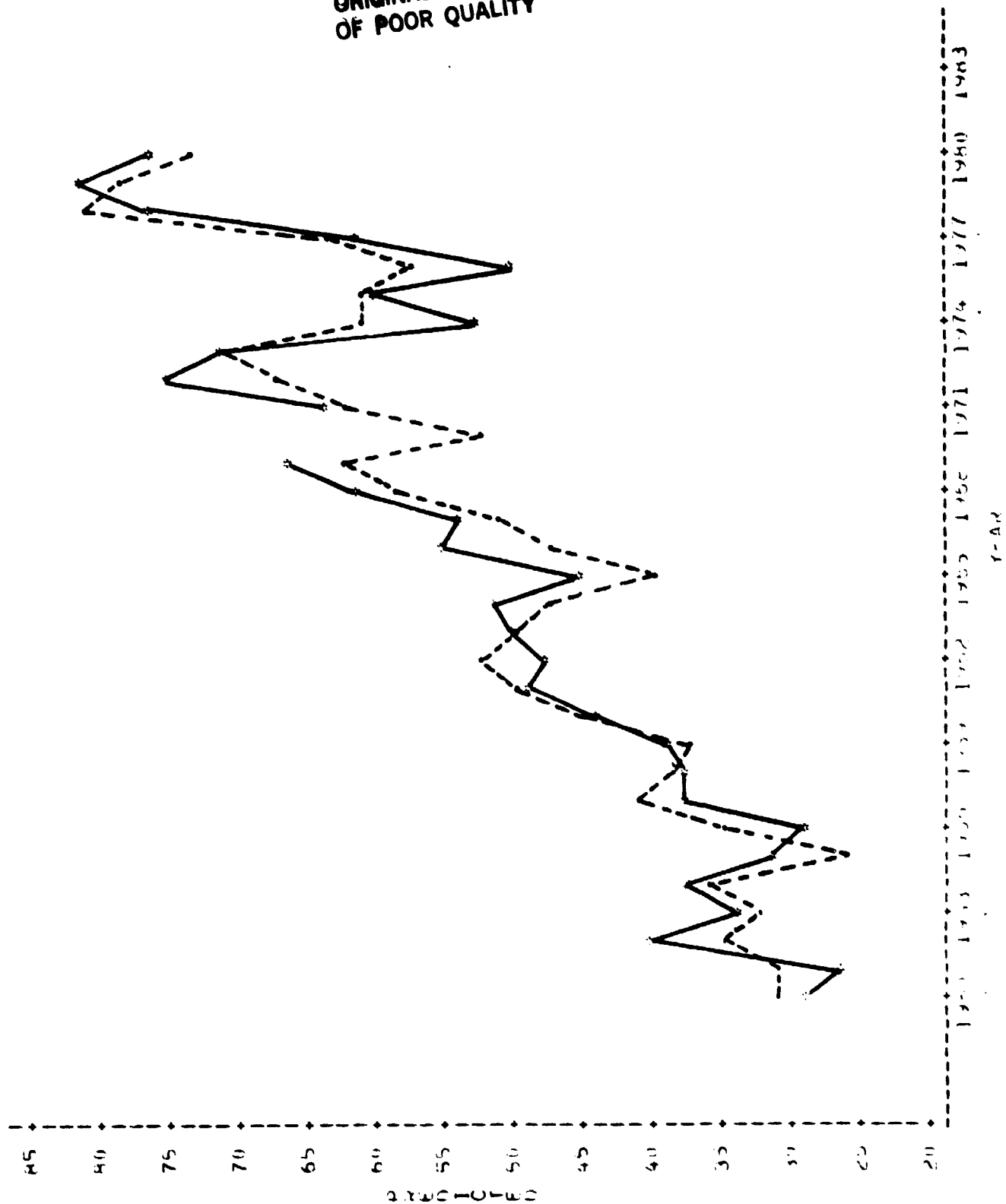






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1. 1950-1951 2. 1952-1953 3. 1954-1955 4. 1956-1957 5. 1958-1959 6. 1960-1961 7. 1962-1963 8. 1964-1965 9. 1966-1967 10. 1968-1969 11. 1970-1971 12. 1972-1973 13. 1974-1975 14. 1976-1977 15. 1978-1979 16. 1980-1981 17. 1982-1983



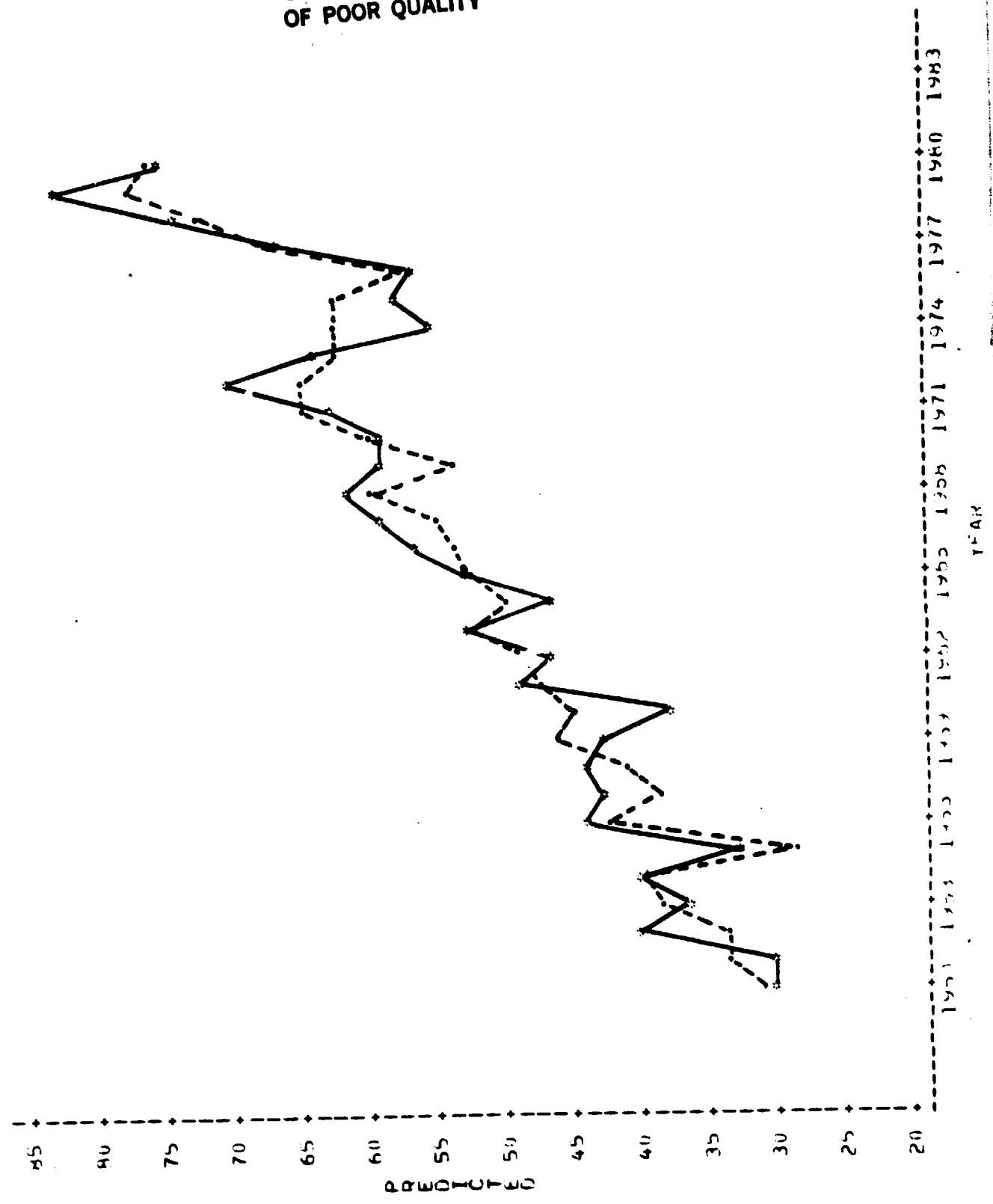


1. The above information is correct and true.



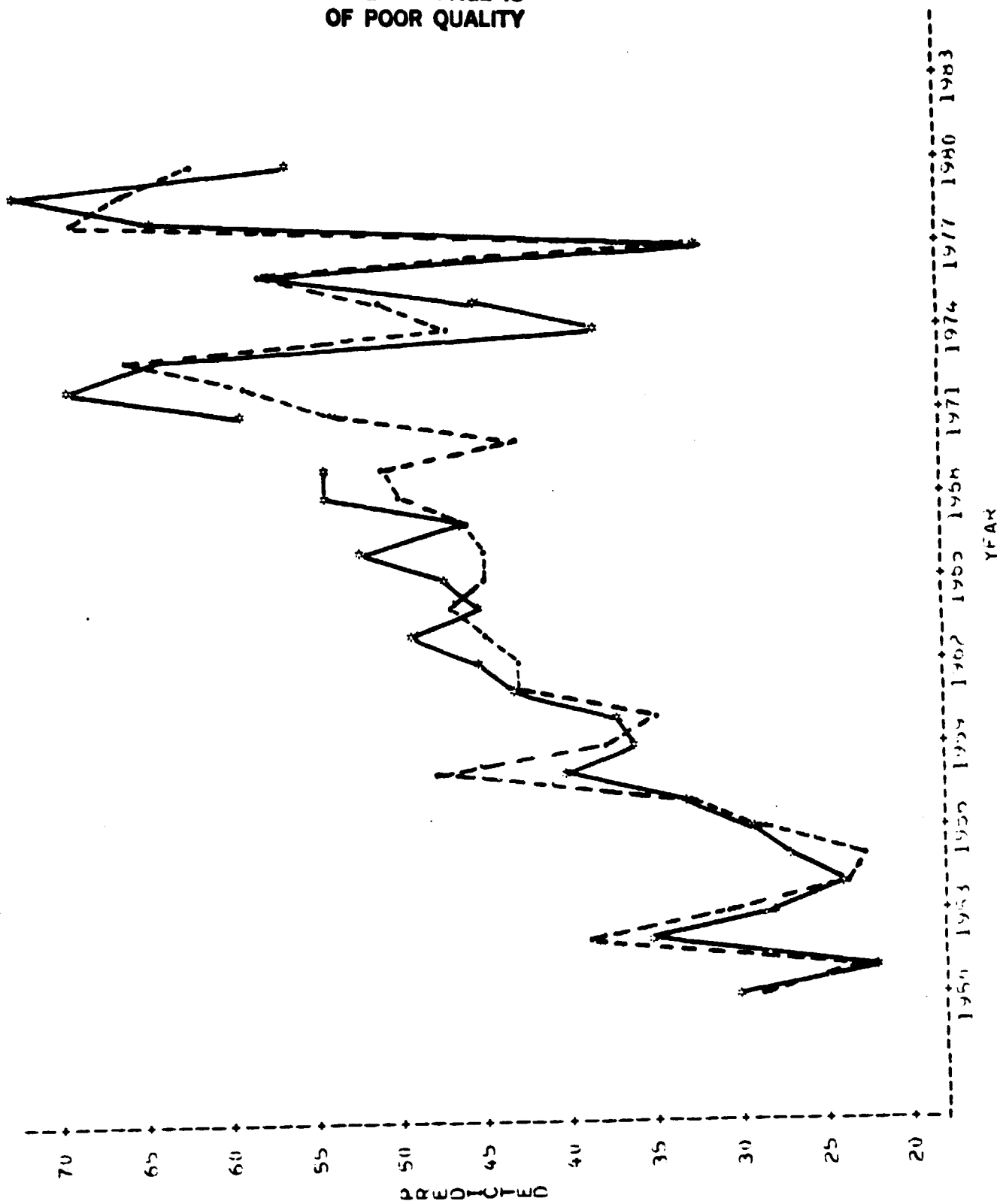
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1000 CUBIC FEET PER YEAR  
SYMBOL USED IS \*



ORIGINAL PAGE IS  
OF POOR QUALITY

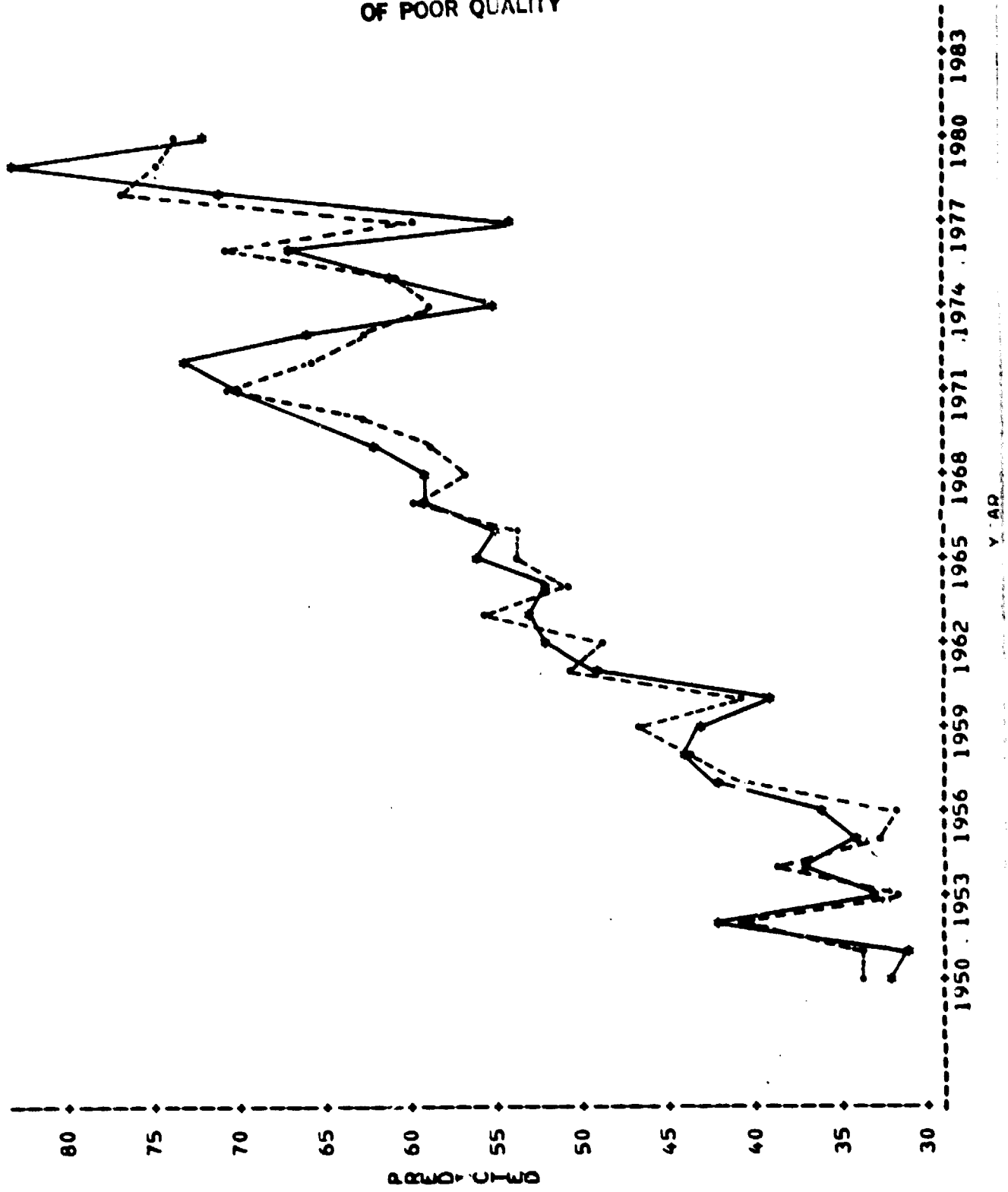
10. CORN SOYBEAN CENTRAL AND 251  
PLOT OF YIELD\*YEAR SYMBOL USED IS #  
PLOT OF YIELD\*YEAR SYMBOL USED IS #



IOWA CORN SOUTHEASTERN APU 252

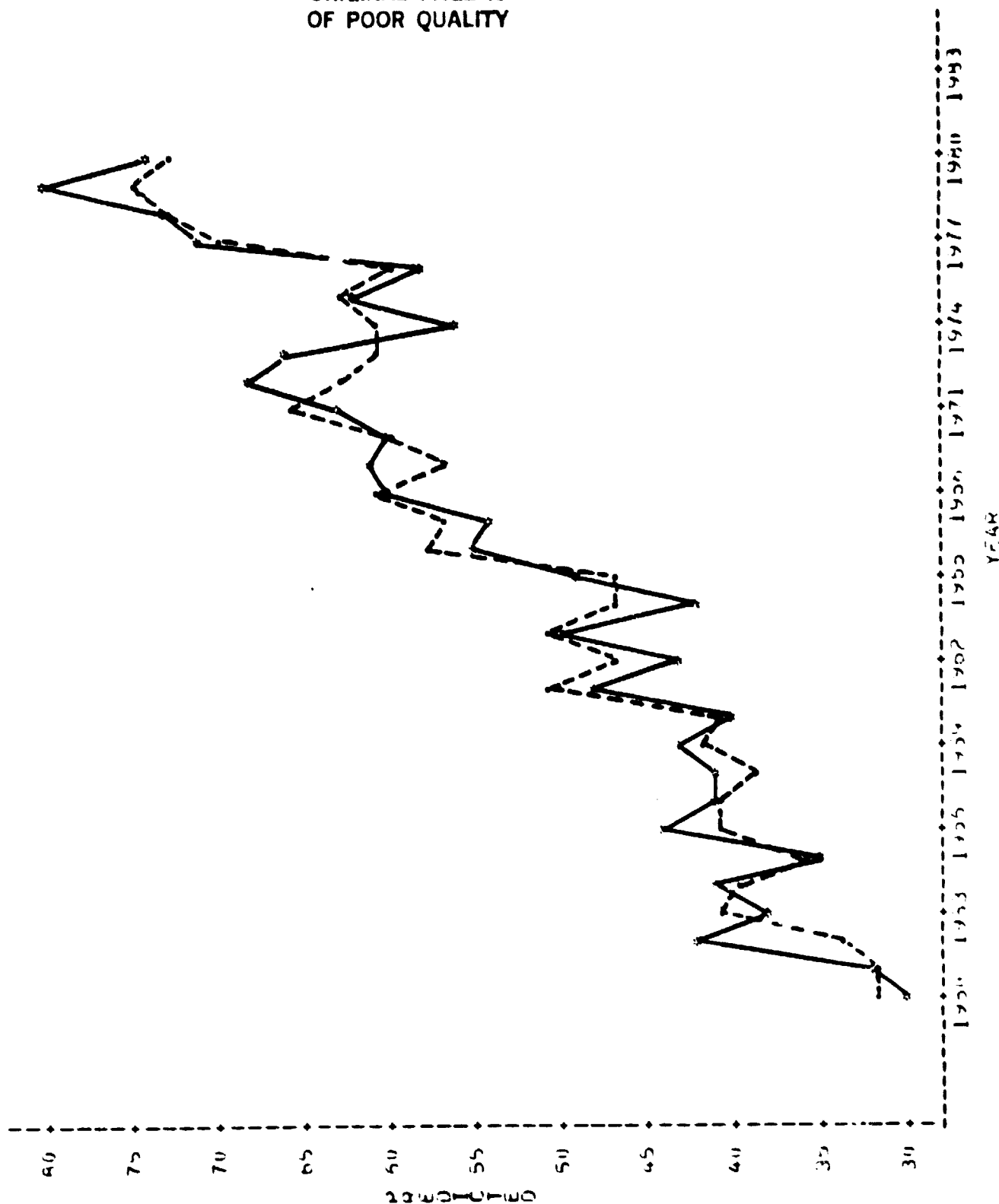
PLOT OF YIELD\*YEAR      SYMBOL USED IS \*  
 PLOT OF YHAT\*YEAR      SYMBOL USED IS :

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• SI (350) THERMISTOR  
# SI (350) THERMISTOR

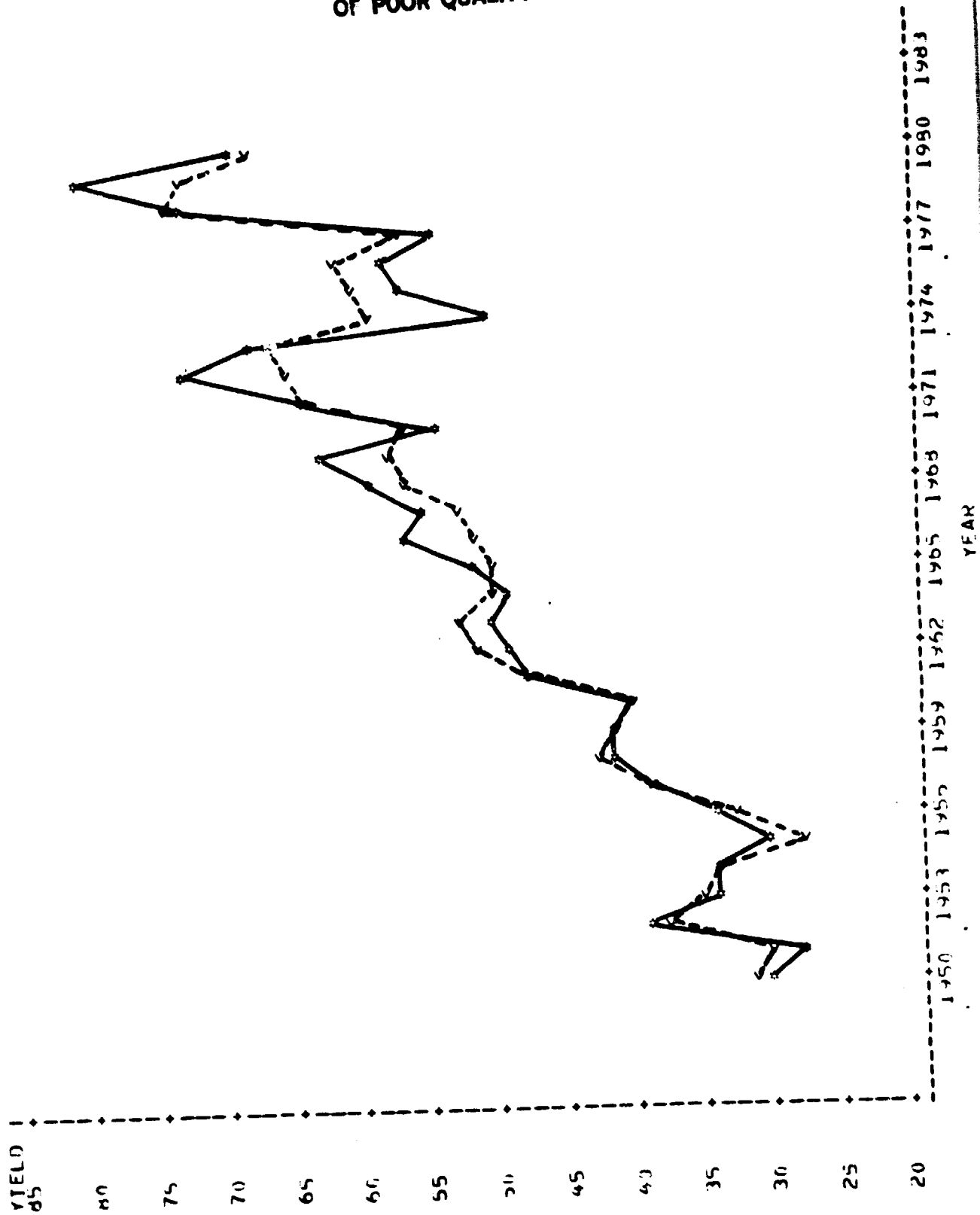
USE FOR CALIBRATION ONLY



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1954 CORD STATE MODEL FOR ALL APPLICABLE STATES

PLOT OF YIELD VS YEAR  
PLOT OF YIELD VS YEAR



ORIGINAL PAGE 13  
OF POOR QUALITY

Appendix C

IOWA SOYBEANS NORTHWESTERN AND 141

Y-AZ	TRF001	TRF002	ET7	ET8	X009
1-00	20	0.1	126.653	104.203	-0.0156
1-01	21	0.1	134.127	121.286	-2.3156
1-02	22	0.1	145.015	113.543	-1.1844
1-03	23	0.1	141.644	113.735	0.7844
1-04	24	0.1	152.460	114.821	1.3844
1-05	25	0.1	133.902	117.294	1.9844
1-06	26	0.1	105.370	90.100	0.4844
1-07	27	0.1	152.164	111.186	-1.4156
1-08	28	0.1	129.680	112.525	-1.3844
1-09	29	0.1	119.355	133.549	-0.7844
1-10	30	0.1	113.015	130.486	-1.1556
1-11	31	0.1	136.841	123.493	-1.5156
1-12	32	0.1	136.541	125.516	-1.6844
1-13	33	2.0	147.016	116.105	-0.5156
1-14	34	3.0	151.831	112.151	-3.7156
1-15	35	4.0	136.224	110.430	-1.0156
1-16	36	5.0	147.916	108.444	-0.8156
1-17	37	6.0	127.524	103.700	-0.3156
1-18	38	7.0	118.411	102.020	-0.4844
1-19	39	8.0	142.016	120.890	0.5844
1-20	40	9.0	127.537	176.890	0.6844
1-21	41	10.0	137.307	98.014	-0.3156
1-22	42	11.0	143.026	111.393	-0.3156
1-23	43	12.0	146.442	111.270	-1.8156
1-24	44	13.0	140.792	114.294	-1.8156
1-25	45	14.0	112.125	126.890	-1.8156
1-26	46	15.0	129.062	153.101	1.8844
1-27	47	16.0	145.790	125.101	2.8844
1-28	48	17.0	129.868	125.231	1.3844
1-29	49	18.0	129.868	125.231	1.3844
1-30	50	19.0	129.868	125.231	1.3844
1-31	51	20.0	129.868	125.231	1.3844

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DATE	TIME	TYPE	TIME	TIME	TIME	TIME
1	1450	20	0.1	1.00688	0.99882	0.99882
2	1451	21	0.1	1.00688	1.00000	1.00000
3	1452	22	0.1	1.00688	1.00000	1.00000
4	1453	23	0.1	0.98778	0.98778	0.98778
5	1454	24	0.1	1.00688	1.00000	1.00000
6	1455	25	0.1	0.97924	0.97924	0.97924
7	1456	26	0.1	0.94662	0.94662	0.94662
8	1457	27	0.1	1.00688	1.00000	1.00000
9	1458	28	0.1	0.94412	0.94412	0.94412
10	1459	29	0.1	1.00688	1.00000	1.00000
11	1500	30	0.1	1.00688	1.00000	1.00000
12	1501	31	0.1	1.00688	1.00000	1.00000
13	1502	32	1.0	1.00688	0.96945	0.96945
14	1503	32	2.0	1.00546	0.95400	0.95400
15	1504	32	3.0	1.00688	1.00000	1.00000
16	1505	32	4.0	1.00688	1.00000	1.00000
17	1506	32	5.0	1.00688	1.00000	1.00000
18	1507	32	6.0	1.00688	1.00000	1.00000
19	1508	32	7.0	1.00688	0.91352	0.91352
20	1509	32	8.0	1.00688	1.00000	1.00000
21	1510	32	9.0	0.99051	0.92603	0.92603
22	1511	32	10.0	1.00688	0.97770	0.97770
23	1512	32	11.0	1.00688	0.95135	0.95135
24	1513	32	12.0	1.00688	0.95962	0.95962
25	1514	32	13.0	1.00688	0.95718	0.95718
26	1515	32	14.0	1.00688	1.00000	1.00000
27	1516	32	15.0	1.00688	0.94470	0.94470
28	1517	32	16.0	0.93446	0.75476	0.75476
29	1518	32	17.0	1.00688	0.96998	0.96998
30	1519	32	18.0	1.00688	0.97327	0.97327
31	1520	32	19.0	1.00688	0.97327	0.97327



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IOWA SOYBEANS NORTHWESTERN CENTRAL APU 241

OBS	YEAR	TREND1	TREND2	DSQS	ET7	ET8	XDD9	E9
1	1950	0	0	40	12	99	0	1
2	1951	2	0	75	33	77	68	0
3	1952	2	0	50	43	45	28	1
4	1953	3	0	15	43	81	88	0
5	1954	5	0	68	18	60	88	1
6	1955	7	0	47	33	65	88	1
7	1956	8	0	47	33	100	88	1
8	1957	8	0	19	52	24	88	1
9	1958	0	0	14	11	08	28	1
10	1959	0	0	05	22	20	38	1
11	1960	0	0	60	33	14	88	1
12	1961	0	0	07	33	09	88	1
13	1962	0	0	11	33	20	88	1
14	1963	0	0	17	33	18	88	1
15	1964	0	0	26	33	06	88	1
16	1965	0	0	61	33	27	88	1
17	1966	0	0	19	33	09	88	1
18	1967	0	0	49	33	20	88	1
19	1968	0	0	28	33	08	88	1
20	1969	0	0	29	33	26	88	1
21	1970	0	0	29	33	06	88	1
22	1971	0	0	29	33	06	88	1
23	1972	0	0	29	33	06	88	1
24	1973	0	0	29	33	06	88	1
25	1974	0	0	29	33	06	88	1
26	1975	0	0	29	33	06	88	1
27	1976	0	0	29	33	06	88	1
28	1977	0	0	29	33	06	88	1
29	1978	0	0	29	33	06	88	1
30	1979	0	0	29	33	06	88	1
31	1980	0	0	29	33	06	88	1
32	1981	0	0	29	33	06	88	1
33	1982	0	0	29	33	06	88	1
34	1983	0	0	29	33	06	88	1
35	1984	0	0	29	33	06	88	1
36	1985	0	0	29	33	06	88	1
37	1986	0	0	29	33	06	88	1
38	1987	0	0	29	33	06	88	1
39	1988	0	0	29	33	06	88	1
40	1989	0	0	29	33	06	88	1
41	1990	0	0	29	33	06	88	1
42	1991	0	0	29	33	06	88	1
43	1992	0	0	29	33	06	88	1
44	1993	0	0	29	33	06	88	1
45	1994	0	0	29	33	06	88	1
46	1995	0	0	29	33	06	88	1
47	1996	0	0	29	33	06	88	1
48	1997	0	0	29	33	06	88	1
49	1998	0	0	29	33	06	88	1
50	1999	0	0	29	33	06	88	1
51	2000	0	0	29	33	06	88	1
52	2001	0	0	29	33	06	88	1
53	2002	0	0	29	33	06	88	1
54	2003	0	0	29	33	06	88	1
55	2004	0	0	29	33	06	88	1
56	2005	0	0	29	33	06	88	1
57	2006	0	0	29	33	06	88	1
58	2007	0	0	29	33	06	88	1
59	2008	0	0	29	33	06	88	1
60	2009	0	0	29	33	06	88	1
61	2010	0	0	29	33	06	88	1
62	2011	0	0	29	33	06	88	1
63	2012	0	0	29	33	06	88	1
64	2013	0	0	29	33	06	88	1
65	2014	0	0	29	33	06	88	1
66	2015	0	0	29	33	06	88	1
67	2016	0	0	29	33	06	88	1
68	2017	0	0	29	33	06	88	1
69	2018	0	0	29	33	06	88	1
70	2019	0	0	29	33	06	88	1
71	2020	0	0	29	33	06	88	1
72	2021	0	0	29	33	06	88	1
73	2022	0	0	29	33	06	88	1
74	2023	0	0	29	33	06	88	1
75	2024	0	0	29	33	06	88	1
76	2025	0	0	29	33	06	88	1
77	2026	0	0	29	33	06	88	1
78	2027	0	0	29	33	06	88	1
79	2028	0	0	29	33	06	88	1
80	2029	0	0	29	33	06	88	1
81	2030	0	0	29	33	06	88	1
82	2031	0	0	29	33	06	88	1
83	2032	0	0	29	33	06	88	1
84	2033	0	0	29	33	06	88	1
85	2034	0	0	29	33	06	88	1
86	2035	0	0	29	33	06	88	1
87	2036	0	0	29	33	06	88	1
88	2037	0	0	29	33	06	88	1
89	2038	0	0	29	33	06	88	1
90	2039	0	0	29	33	06	88	1
91	2040	0	0	29	33	06	88	1
92	2041	0	0	29	33	06	88	1
93	2042	0	0	29	33	06	88	1
94	2043	0	0	29	33	06	88	1
95	2044	0	0	29	33	06	88	1
96	2045	0	0	29	33	06	88	1
97	2046	0	0	29	33	06	88	1
98	2047	0	0	29	33	06	88	1
99	2048	0	0	29	33	06	88	1
100	2049	0	0	29	33	06	88	1

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IOWA SOYBEANS SOUTHERN CENTRAL APU 251

OBS	YEAR	TREND1	TREND2	PDD5	ET6	ET8
1	1950	0	0	40	127	1
2	1951	2	0	34	109	1
3	1952	2	0	22	143	0
4	1953	3	0	-69	143	0
5	1954	4	0	-30	125	0
6	1955	5	0	-35	195	0
7	1956	6	0	6	240	0
8	1957	7	0	35	110	0
9	1958	8	0	36	322	0
0	1959	9	0	38	112	0
1	1960	30	0	22	225	0
2	1961	32	1	44	225	0
3	1962	33	2	56	236	0
4	1963	33	3	23	225	0
5	1964	33	4	10	223	0
6	1965	33	5	10	223	0
7	1966	33	6	4	223	0
8	1967	33	7	10	223	0
9	1968	33	8	4	223	0
0	1969	33	9	1	223	0
1	1970	33	0	1	223	0
2	1971	33	0	5	223	0
3	1972	33	0	1	223	0
4	1973	33	0	10	223	0
5	1974	33	0	2	223	0
6	1975	33	0	6	223	0
7	1976	33	0	12	223	0
8	1977	33	0	4	223	0
9	1978	33	0	20	223	0
0	1979	33	0	4	223	0
1	1980	33	0	4	223	0
2	1981	33	0	4	223	0
3	1982	33	0	4	223	0
4	1983	33	0	4	223	0

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OBS	YEAR	TREND1	TREND2	ET6	E8	DS07	XDD9	ETHAT9
1	1951	20	00	123	0	20932	15	75
2	1952	22	00	115	1	245	16	67
3	1953	22	00	140	0	359	45	78
4	1954	22	00	146	0	622	0	81
5	1955	22	00	149	1	689	0	86
6	1956	22	00	126	1	873	1	87
7	1957	22	00	110	0	873	1	77
8	1958	22	00	102	0	511	1	70
9	1959	22	00	125	0	763	1	79
10	1960	22	00	112	0	852	1	85
11	1961	22	00	145	0	344	1	85
12	1962	22	00	138	0	306	1	69
13	1963	22	00	130	0	342	1	76
14	1964	22	00	137	0	235	1	69
15	1965	22	00	131	0	367	1	71
16	1966	22	00	128	0	335	1	69
17	1967	22	00	150	0	335	1	75
18	1968	22	00	137	0	405	1	77
19	1969	22	00	159	0	282	1	82
20	1970	22	00	147	0	120	1	82
21	1971	22	00	140	0	150	1	82
22	1972	22	00	139	0	171	1	82
23	1973	22	00	147	0	160	1	82
24	1974	22	00	132	0	186	1	82
25	1975	22	00	139	0	125	1	82
26	1976	22	00	130	0	565	1	82
27	1977	22	00	136	0	110	1	82
28	1978	22	00	136	0	110	1	82
29	1979	22	00	136	0	110	1	82
30	1980	22	00	136	0	110	1	82
31	1981	22	00	136	0	110	1	82
32	1982	22	00	136	0	110	1	82
33	1983	22	00	136	0	110	1	82
34	1984	22	00	136	0	110	1	82
35	1985	22	00	136	0	110	1	82
36	1986	22	00	136	0	110	1	82
37	1987	22	00	136	0	110	1	82
38	1988	22	00	136	0	110	1	82
39	1989	22	00	136	0	110	1	82
40	1990	22	00	136	0	110	1	82
41	1991	22	00	136	0	110	1	82
42	1992	22	00	136	0	110	1	82
43	1993	22	00	136	0	110	1	82
44	1994	22	00	136	0	110	1	82
45	1995	22	00	136	0	110	1	82
46	1996	22	00	136	0	110	1	82
47	1997	22	00	136	0	110	1	82
48	1998	22	00	136	0	110	1	82
49	1999	22	00	136	0	110	1	82
50	2000	22	00	136	0	110	1	82

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IOWA SOYBEANS STATE MODEL FOR ALL APUS IN STATE

OBS	YEAR	TREND1	TREND2	D1	D4	D5	DS05	ET6	P07	ET9	ET9
1	1951	0	1	1	0	0	1407	122	127	108	73
2	1952	2	1	1	0	0	1752	104	187	121	66
3	1953	2	1	1	0	0	753	145	163	118	79
4	1954	2	1	1	0	0	600	135	143	113	57
5	1955	2	1	1	0	0	1825	100	197	114	72
6	1956	2	1	1	0	0	1525	100	104	90	55
7	1957	2	1	1	0	0	29418	109	197	112	72
8	1958	2	1	1	0	0	12986	104	132	103	53
9	1959	2	1	1	0	0	11322	105	158	120	63
0	1960	2	1	1	0	0	4687	105	103	123	84
1	1961	2	1	1	0	0	11987	105	133	125	73
2	1962	2	1	1	0	0	7134	105	158	125	84
3	1963	2	1	1	0	0	21467	105	103	125	73
4	1964	2	1	1	0	0	5409	105	133	125	84
5	1965	2	1	1	0	0	23465	105	158	125	84
6	1966	2	1	1	0	0	19735	105	103	125	84
7	1967	2	1	1	0	0	11724	105	133	125	84
8	1968	2	1	1	0	0	5110	105	158	125	84
9	1969	2	1	1	0	0	11333	105	103	125	84
0	1970	2	1	1	0	0	18871	105	133	125	84
1	1971	2	1	1	0	0	6011	105	158	125	84
2	1972	2	1	1	0	0	38298	105	103	125	84
3	1973	2	1	1	0	0	14356	105	133	125	84
4	1974	2	1	1	0	0	21467	105	158	125	84
5	1975	2	1	1	0	0	18356	105	103	125	84
6	1976	2	1	1	0	0	21467	105	133	125	84
7	1977	2	1	1	0	0	18356	105	158	125	84
8	1978	2	1	1	0	0	21467	105	103	125	84
9	1979	2	1	1	0	0	18356	105	133	125	84
0	1980	2	1	1	0	0	21467	105	158	125	84
1	1981	2	1	1	0	0	18356	105	103	125	84
2	1982	2	1	1	0	0	21467	105	133	125	84
3	1983	2	1	1	0	0	18356	105	158	125	84
4	1984	2	1	1	0	0	21467	105	103	125	84
5	1985	2	1	1	0	0	18356	105	133	125	84
6	1986	2	1	1	0	0	21467	105	158	125	84
7	1987	2	1	1	0	0	18356	105	103	125	84
8	1988	2	1	1	0	0	21467	105	133	125	84
9	1989	2	1	1	0	0	18356	105	158	125	84
0	1990	2	1	1	0	0	21467	105	103	125	84
1	1991	2	1	1	0	0	18356	105	133	125	84
2	1992	2	1	1	0	0	21467	105	158	125	84
3	1993	2	1	1	0	0	18356	105	103	125	84
4	1994	2	1	1	0	0	21467	105	133	125	84
5	1995	2	1	1	0	0	18356	105	158	125	84
6	1996	2	1	1	0	0	21467	105	103	125	84
7	1997	2	1	1	0	0	18356	105	133	125	84
8	1998	2	1	1	0	0	21467	105	158	125	84
9	1999	2	1	1	0	0	18356	105	103	125	84
0	2000	2	1	1	0	0	21467	105	133	125	84
1	2001	2	1	1	0	0	18356	105	158	125	84
2	2002	2	1	1	0	0	21467	105	103	125	84
3	2003	2	1	1	0	0	18356	105	133	125	84
4	2004	2	1	1	0	0	21467	105	158	125	84
5	2005	2	1	1	0	0	18356	105	103	125	84
6	2006	2	1	1	0	0	21467	105	133	125	84
7	2007	2	1	1	0	0	18356	105	158	125	84
8	2008	2	1	1	0	0	21467	105	103	125	84
9	2009	2	1	1	0	0	18356	105	133	125	84
0	2010	2	1	1	0	0	21467	105	158	125	84
1	2011	2	1	1	0	0	18356	105	103	125	84
2	2012	2	1	1	0	0	21467	105	133	125	84
3	2013	2	1	1	0	0	18356	105	158	125	84
4	2014	2	1	1	0	0	21467	105	103	125	84
5	2015	2	1	1	0	0	18356	105	133	125	84
6	2016	2	1	1	0	0	21467	105	158	125	84
7	2017	2	1	1	0	0	18356	105	103	125	84
8	2018	2	1	1	0	0	21467	105	133	125	84
9	2019	2	1	1	0	0	18356	105	158	125	84
0	2020	2	1	1	0	0	21467	105	103	125	84
1	2021	2	1	1	0	0	18356	105	133	125	84
2	2022	2	1	1	0	0	21467	105	158	125	84
3	2023	2	1	1	0	0	18356	105	103	125	84
4	2024	2	1	1	0	0	21467	105	133	125	84
5	2025	2	1	1	0	0	18356	105	158	125	84
6	2026	2	1	1	0	0	21467	105	103	125	84
7	2027	2	1	1	0	0	18356	105	133	125	84
8	2028	2	1	1	0	0	21467	105	158	125	84
9	2029	2	1	1	0	0	18356	105	103	125	84
0	2030	2	1	1	0	0	21467	105	133	125	84
1	2031	2	1	1	0	0	18356	105	158	125	84
2	2032	2	1	1	0	0	21467	105	103	125	84
3	2033	2	1	1	0	0	18356	105	133	125	84
4	2034	2	1	1	0	0	21467	105	158	125	84
5	2035	2	1	1	0	0	18356	105	103	125	84
6	2036	2	1	1	0	0	21467	105	133	125	84
7	2037	2	1	1	0	0	18356	105	158	125	84
8	2038	2	1	1	0	0	21467	105	103	125	84
9	2039	2	1	1	0	0	18356	105	133	125	84
0	2040	2	1	1	0	0	21467	105	158	125	84
1	2041	2	1	1	0	0	18356	105	103	125	84
2	2042	2	1	1	0	0	21467	105	133	125	84
3	2043	2	1	1	0	0	18356	105	158	125	84
4	2044	2	1	1	0	0	21467	105	103	125	84
5	2045	2	1	1	0	0	18356	105	133	125	84
6	2046	2	1	1	0	0	21467	105	158	125	84
7	2047	2	1	1	0	0	18356	105	103	125	84
8	2048	2	1	1	0	0	21467	105	133	125	84
9	2049	2	1	1	0	0	18356	105	158	125	84
0	2050	2	1	1	0	0	21467	105	103	125	84
1	2051	2	1	1	0	0	18356	105	133	125	84
2	2052	2	1	1	0	0	21467	105	158	125	84
3	2053	2	1	1	0	0	18356	105	103	125	84
4	2054	2	1	1	0	0	21467	105	133	125	84
5	2055	2	1	1	0	0	18356	105	158	125	84
6	2056	2	1	1	0	0	21467	105	103	125	84
7	2057	2	1	1	0	0	18356	105	133	125	84
8	2058	2	1	1	0	0	21467	105	158	125	84
9	2059	2	1	1	0	0	18356	105	103	125	84
0	2060	2	1	1	0	0	21467	105	133	125	84
1	2061	2	1	1	0	0	18356	105	158	125	84
2	2062	2	1	1	0	0	21467	105	103	125	84
3	2063	2	1	1	0	0	18356	105	133	125	84
4	2064	2	1	1	0	0	21467	105	158	125	84
5	2065	2	1	1	0	0	18356	105	103	125	84
6	2066	2	1	1	0	0	21467	105	133	125	84
7	2067	2	1	1	0	0	18356	105	158	125	84
8	2068	2	1	1	0	0	21467	105	103	125	84
9	2069	2	1	1	0	0	18356	105	133	125	84
0	2070	2	1	1	0	0	21467	105	158	125	84
1	2071	2	1	1	0	0	18356	105	103	125	84
2	2072	2	1	1	0	0	21467	105	133	125	84
3	2073	2	1	1	0	0	18356	105	158	125	84
4	2074	2	1	1	0	0	21467	105	103	125	84
5	2075	2	1	1	0	0	18356	105	133	125	84
6	2076	2	1	1	0	0	21467	105	158	125	84
7	2077	2	1	1	0	0	18356	105	103	125	84
8	2078	2	1	1	0	0	21467	105	133	125	84
9	2079	2	1	1	0	0	18356	105	158	125	84
0	2080	2	1	1	0	0	21467	105	103	125	84
1	2081	2	1	1	0	0	18356	105	133	125	84
2	2082	2	1	1	0	0	21467	105	158	125	84
3	2083	2	1	1	0	0	18356	105	103	125	84
4	2084	2	1	1	0	0	21467	105	133	125	84
5	2085	2	1	1	0	0	18356	105	158	125	84
6	2086	2	1	1	0	0					

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OBS	YEAR	TREND1	TREND2	D1	D4	D5	D5Q5	FT6	PD7	ETA	ET9
63	1977	32	0	0	0	0	21999.6	106.187	106	124.283	89.729
64	1978	32	0	0	0	0	28452.1	131.028	180	124.612	100.980
65	1979	32	0	0	0	0	7687.3	127.632	142	114.079	85.513
66	1980	32	0	0	0	0	3561.4	127.632	142	114.079	85.513
67	1981	32	0	0	0	0	485.4	37	127	99	74
68	1982	32	0	0	0	0	55.7	383	130	95	66
69	1983	32	0	0	0	0	47.4	610	130	81	69
70	1984	32	0	0	0	0	45.7	149	68	52	82
71	1985	32	0	0	0	0	45.7	231	85	20	61
72	1986	32	0	0	0	0	45.7	481	103	47	26
73	1987	32	0	0	0	0	45.7	503	103	52	43
74	1988	32	0	0	0	0	45.7	503	103	52	43
75	1989	32	0	0	0	0	45.7	503	103	52	43
76	1990	32	0	0	0	0	45.7	503	103	52	43
77	1991	32	0	0	0	0	45.7	503	103	52	43
78	1992	32	0	0	0	0	45.7	503	103	52	43
79	1993	32	0	0	0	0	45.7	503	103	52	43
80	1994	32	0	0	0	0	45.7	503	103	52	43
81	1995	32	0	0	0	0	45.7	503	103	52	43
82	1996	32	0	0	0	0	45.7	503	103	52	43
83	1997	32	0	0	0	0	45.7	503	103	52	43
84	1998	32	0	0	0	0	45.7	503	103	52	43
85	1999	32	0	0	0	0	45.7	503	103	52	43
86	2000	32	0	0	0	0	45.7	503	103	52	43
87	2001	32	0	0	0	0	45.7	503	103	52	43
88	2002	32	0	0	0	0	45.7	503	103	52	43
89	2003	32	0	0	0	0	45.7	503	103	52	43
90	2004	32	0	0	0	0	45.7	503	103	52	43
91	2005	32	0	0	0	0	45.7	503	103	52	43
92	2006	32	0	0	0	0	45.7	503	103	52	43
93	2007	32	0	0	0	0	45.7	503	103	52	43
94	2008	32	0	0	0	0	45.7	503	103	52	43
95	2009	32	0	0	0	0	45.7	503	103	52	43
96	2010	32	0	0	0	0	45.7	503	103	52	43
97	2011	32	0	0	0	0	45.7	503	103	52	43
98	2012	32	0	0	0	0	45.7	503	103	52	43
99	2013	32	0	0	0	0	45.7	503	103	52	43
100	2014	32	0	0	0	0	45.7	503	103	52	43



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IOWA SOYBEANS STATE MODEL FOR ALL APUS IN STATE

12

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OBS	YEAR	TREND1	TREND2	D1	D4	D5	DS05	ET6	PD7	ET8	ET9
1	1957	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	1958	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	1959	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	1960	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	1961	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
6	1962	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
7	1963	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
8	1964	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
9	1965	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
10	1966	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
11	1967	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
12	1968	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
13	1969	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
14	1970	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	1971	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
16	1972	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
17	1973	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
18	1974	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
19	1975	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
20	1976	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
21	1977	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
22	1978	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23	1979	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
24	1980	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
25	1981	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
26	1982	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
27	1983	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
28	1984	0.0000	0.0000	0.0000	0.0000	0.					

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Year	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
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Page	Date	Time	Lat	Long	Alt
1	1971	12	33 20 00	-1 17 30	0.93007
2	1971	13	33 20 00	-1 17 30	0.93007
3	1971	14	33 20 00	-1 17 30	0.93007
4	1971	15	33 20 00	-1 17 30	0.93007
5	1971	16	33 20 00	-1 17 30	0.93007
6	1971	17	33 20 00	-1 17 30	0.93007
7	1971	18	33 20 00	-1 17 30	0.93007
8	1971	19	33 20 00	-1 17 30	0.93007
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10	1971	21	33 20 00	-1 17 30	0.93007
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12	1971	23	33 20 00	-1 17 30	0.93007
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17	1971	28	33 20 00	-1 17 30	0.93007
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22	1971	33	33 20 00	-1 17 30	0.93007
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24	1971	35	33 20 00	-1 17 30	0.93007
25	1971	36	33 20 00	-1 17 30	0.93007
26	1971	37	33 20 00	-1 17 30	0.93007
27	1971	38	33 20 00	-1 17 30	0.93007
28	1971	39	33 20 00	-1 17 30	0.93007
29	1971	40	33 20 00	-1 17 30	0.93007
30	1971	41	33 20 00	-1 17 30	0.93007
31	1971	42	33 20 00	-1 17 30	0.93007
32	1971	43	33 20 00	-1 17 30	0.93007
33	1971	44	33 20 00	-1 17 30	0.93007
34	1971	45	33 20 00	-1 17 30	0.93007

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1	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
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OPS	YF00	YF01	YF02	YF03	YF04	YF05	YF06	YF07
1	1951	22.0041	1	1.0	117.135	1.00439		
2	1951	31.0075	2	1.0	117.135	1.00439		
3	1952	41.0000	3	1.0	117.135	1.00439		
4	1953	33.0030	4	1.0	117.135	1.00439		
5	1954	41.0000	5	1.0	117.135	1.00439		
6	1955	35.0043	6	1.0	117.135	1.00439		
7	1956	43.0030	7	1.0	117.135	1.00439		
8	1957	41.0000	8	1.0	117.135	1.00439		
9	1958	42.0030	9	1.0	117.135	1.00439		
10	1959	39.0000	10	1.0	117.135	1.00439		
11	1960	43.0030	11	1.0	117.135	1.00439		
12	1961	41.0000	12	1.0	117.135	1.00439		
13	1962	43.0030	13	1.0	117.135	1.00439		
14	1963	50.0000	14	1.0	117.135	1.00439		
15	1964	42.0030	15	1.0	117.135	1.00439		
16	1965	43.0030	16	1.0	117.135	1.00439		
17	1966	54.0000	17	1.0	117.135	1.00439		
18	1967	54.0000	18	1.0	117.135	1.00439		
19	1968	59.0000	19	1.0	117.135	1.00439		
20	1969	60.0000	20	1.0	117.135	1.00439		
21	1970	53.0000	21	1.0	117.135	1.00439		
22	1971	53.0000	22	1.0	117.135	1.00439		
23	1972	53.0000	23	1.0	117.135	1.00439		
24	1973	60.0000	24	1.0	117.135	1.00439		
25	1974	62.0000	25	1.0	117.135	1.00439		
26	1975	62.0000	26	1.0	117.135	1.00439		
27	1976	60.0000	27	1.0	117.135	1.00439		
28	1977	70.0000	28	1.0	117.135	1.00439		
29	1978	73.0000	29	1.0	117.135	1.00439		
30	1979	73.0000	30	1.0	117.135	1.00439		
31	1980	73.0000	31	1.0	117.135	1.00439		
32	1981	73.0000	32	1.0	117.135	1.00439		
33	1982	73.0000	33	1.0	117.135	1.00439		
34	1983	73.0000	34	1.0	117.135	1.00439		

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1974 CENSUS STATE MODEL FOR ALL AGES IN STATE

AGE	YEAR	1960	DI	ETG	WT	ETP
1	1950	1	1	122.450	0.57173	1.00000
2	1951	2	1	104.816	0.03746	0.98236
3	1952	3	1	145.133	1.02743	1.00000
4	1953	4	1	142.906	0.41651	0.95140
5	1954	5	1	135.204	0.26506	0.94216
6	1955	6	1	94.068	0.00257	0.77631
7	1956	7	1	100.230	0.09125	0.75107
8	1957	8	1	119.483	0.05929	0.92936
9	1958	9	1	113.968	1.01845	1.00000
10	1959	10	1	135.233	0.17416	0.85041
11	1960	11	1	114.880	0.40843	0.93744
12	1961	12	1	123.206	0.56390	0.96428
13	1962	13	1	120.226	1.01114	1.00000
14	1963	14	1	142.444	0.07147	0.92979
15	1964	15	1	126.200	0.66474	0.95784
16	1965	16	1	124.646	0.56469	0.94457
17	1966	17	1	124.401	0.44417	0.92330
18	1967	18	1	120.226	0.27637	0.94619
19	1968	19	1	135.264	0.59415	0.83551
20	1969	20	1	106.556	0.97179	0.97419
21	1970	21	1	129.593	0.37520	0.82467
22	1971	22	1	145.986	0.53523	0.96117
23	1972	23	1	127.027	1.19493	1.00000
24	1973	24	1	131.477	0.91943	0.97110
25	1974	25	1	121.054	0.17955	0.91236
26	1975	26	1	123.954	0.19438	0.71623
27	1976	27	1	125.497	0.22337	0.81979
28	1977	28	1	110.102	0.09850	1.00000
29	1978	29	1	125.071	1.04294	0.85572
30	1979	30	1	126.627	0.45528	0.71256
31	1980	31	1	122.130	0.24013	0.00000
32	1981	32	1	123.611	1.31726	0.98569
33	1982	33	1	108.645	0.67906	0.96907
34	1983	34	1	156.936	0.57636	0.82463
35	1984	35	1	147.260	0.51482	0.72818
36	1985	36	1	145.479	0.09599	0.86229
37	1986	37	1	115.493	0.26285	0.93362
38	1987	38	1	98.398	0.92216	0.92336
39	1988	39	1	124.780	0.33726	1.00000
40	1989	40	1	106.710	0.45628	0.92720
41	1990	41	1	137.427	0.26504	0.96014
42	1991	42	1	121.055	0.42462	0.98441
43	1992	43	1	123.099	0.67311	1.00000
44	1993	44	1	124.062	1.04619	0.82577
45	1994	45	1	142.676	0.48494	0.94003
46	1995	46	1	127.124	1.10478	1.00000
47	1996	47	1	127.914	0.39346	0.94637
48	1997	48	1	128.700	0.33143	0.95144
49	1998	49	1	129.340	0.22396	0.81379
50	1999	50	1	115.473	0.92457	1.00000
51	2000	51	1	125.071	0.49508	0.81600
52	2001	52	1	120.217	0.41789	0.87116
53	2002	53	1	129.054	1.14440	1.00000
54	2003	54	1	134.188	1.17772	1.00000
55	2004	55	1	119.442	0.69079	0.73711
56	2005	56	1	130.276	0.14902	0.92713
57	2006	57	1	122.325	4.04325	0.00000

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YRS	YEAR	PERIOD	Q1	E16	NR7	E1P7
62	1977	25	1	196.240	0.63438	0.77122
63	1978	29	1	190.970	1.21150	1.00000
64	1979	30	1	127.580	0.99409	0.99464
65	1980	31	1	137.427	0.36052	0.87756
66	1981	32	1	.	.	.
67	1982	33	1	.	.	.
68	1983	34	1	.	.	.
69	1984	1	0	120.250	1.01145	1.00000
70	1985	2	0	103.481	0.87471	1.00000
71	1986	3	0	141.549	0.90041	0.99209
72	1987	4	0	138.551	0.54857	0.97227
73	1988	5	0	134.075	0.41935	0.95832
74	1989	6	0	102.680	0.47949	0.78910
75	1990	7	0	104.339	0.63231	0.73407
76	1991	8	0	119.340	0.67603	0.95547
77	1992	9	0	107.806	0.80138	0.95150
78	1993	10	0	133.248	0.12878	0.84137
79	1994	11	0	113.419	0.44119	0.91324
80	1995	12	0	123.357	0.75218	0.96550
81	1996	13	0	119.340	1.31541	1.00000
82	1997	14	0	137.775	0.87759	0.97141
83	1998	15	0	125.458	0.86450	0.97709
84	1999	16	0	123.081	0.22584	0.89098
85	2000	17	0	124.528	0.37142	0.94514
86	2001	18	0	120.069	0.67502	0.84697
87	2002	19	0	131.105	0.97549	1.00000
88	2003	20	0	104.907	0.52114	0.97438
89	2004	21	0	127.938	0.72712	1.00000
90	2005	22	0	144.557	1.09152	0.98358
91	2006	23	0	121.996	0.92931	0.92751
92	2007	24	0	129.638	0.26060	0.98358
93	2008	25	0	120.069	0.11149	0.92791
94	2009	26	0	122.936	0.23389	0.80973
95	2010	27	0	123.959	0.63457	0.82545
96	2011	28	0	114.291	0.26724	1.00000
97	2012	29	0	124.011	1.26468	0.97752
98	2013	30	0	123.145	0.41728	0.79790
99	2014	31	0	120.230	.	.
100	2015	32	0	.	.	.
101	2016	33	0	19.899	0.70483	0.99067
102	2017	34	0	196.851	0.43331	0.99302
103	2018	1	0	142.195	0.78911	0.99072
104	2019	2	0	136.209	0.70030	0.98233
105	2020	3	0	136.935	0.34534	0.95485
106	2021	4	0	110.057	0.69315	0.90697
107	2022	5	0	124.913	0.81117	0.90374
108	2023	6	0	122.099	0.55458	0.90970
109	2024	7	0	106.258	1.30058	1.00000
110	2025	8	0	133.138	0.35471	0.93834
111	2026	9	0	114.654	0.41531	0.90870
112	2027	10	0	120.390	1.09904	1.00000
113	2028	11	0	119.429	1.29427	1.00000
114	2029	12	0	148.160	1.15109	1.00000
115	2030	13	0	125.832	0.81324	0.97073
116	2031	14	0	122.932	0.56263	0.94870
117	2032	15	0	125.730	0.54462	0.97126
118	2033	16	0	122.930	0.30448	0.94978
119	2034	17	0	130.960	1.04583	1.00000
120	2035	18	0	.	.	.
121	2036	19	0	.	.	.

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1964 COLUMBIA STATE MODEL FOR ALL APUS IN STATE

OFF	YEAR	1960	91	ET6	RT	ELP7
123	1970	21	0	127.309	0.05220	0.92245
124	1971	22	0	147.446	0.00757	0.94959
125	1972	23	0	121.365	0.95745	1.00000
126	1973	24	0	131.462	0.73196	0.94253
127	1974	25	0	116.449	0.34042	0.95348
128	1975	26	0	126.519	0.15402	0.93347
129	1976	27	0	125.372	0.38309	0.89709
130	1977	28	0	103.254	0.50321	0.74144
131	1978	29	0	127.238	1.01679	1.00000
132	1979	30	0	123.785	1.04240	1.00000
133	1980	31	0	125.075	0.40017	0.90933
134	1981	32	0	.	.	.
135	1982	33	0	.	.	.
136	1983	34	0	116.879	0.93133	1.00000
137	1984	1	0	107.557	0.87944	1.00000
138	1985	2	0	135.985	0.49844	1.00000
139	1986	3	0	132.924	0.94654	1.00000
140	1987	4	0	137.361	0.37445	0.95471
141	1988	5	0	110.033	0.55461	0.90423
142	1989	6	0	134.068	0.90733	0.97524
143	1990	7	0	120.087	0.54401	0.94778
144	1991	8	0	106.154	0.96290	0.99290
145	1992	9	0	127.736	0.55328	0.97487
146	1993	10	0	112.551	0.67114	0.97818
147	1994	11	0	118.509	1.33476	1.00000
148	1995	12	0	116.735	1.51539	1.00000
149	1996	13	0	128.154	1.11373	1.00000
150	1997	14	0	125.572	0.41207	0.95482
151	1998	15	0	118.324	0.86377	0.96741
152	1999	16	0	123.404	0.70067	0.98702
153	1967	17	0	127.582	0.99586	0.95539
154	1968	18	0	124.786	0.99586	1.00000
155	1969	19	0	103.322	1.21620	1.00000
156	1970	20	0	124.054	0.84069	0.98812
157	1971	21	0	144.132	0.94945	0.95554
158	1972	22	0	118.132	1.32726	1.00000
159	1973	23	0	131.455	0.50062	0.95211
160	1974	24	0	111.128	0.45745	0.96240
161	1975	25	0	126.531	0.24336	0.90198
162	1976	26	0	122.054	0.43312	0.85844
163	1977	27	0	110.356	0.66992	0.93496
164	1978	28	0	127.054	0.93596	1.00000
165	1979	29	0	124.133	0.94322	1.00000
166	1980	30	0	124.133	0.45131	0.95543
167	1981	31	0	.	.	.
168	1982	32	0	.	.	.
169	1983	33	0	.	.	.
170	1984	34	0	121.533	0.01965	0.94214
171	1985	1	1	107.272	0.01746	0.94003
172	1986	2	1	149.682	0.48138	0.96512
173	1987	3	1	143.683	0.34032	0.86595
174	1988	4	1	141.757	0.12175	0.78599
175	1989	5	1	112.249	0.47313	0.90031
176	1990	6	1	95.846	1.02238	1.00000
177	1991	7	1	124.610	0.38206	0.95241
178	1992	8	1	110.464	2.21037	1.00000
179	1993	9	1	132.435	0.43353	0.92231
180	1994	10	1	114.513	0.41200	0.95924
181	1995	11	1	121.354	0.82844	0.97012
182	1996	12	1	123.075	0.77714	0.95179

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DATE	TIME	Q1	Q2	Q3	Q4	Q5
1963	14	1	135.434	0.74450	0.89777	0.89777
1964	15	1	126.914	0.67864	0.89777	0.89777
1965	16	1	123.050	0.53785	0.89777	0.89777
1966	17	1	122.316	0.56209	0.89777	0.89777
1967	18	1	122.316	0.56209	0.89777	0.89777
1968	19	1	130.763	0.71449	0.89777	0.89777
1969	20	1	111.734	1.05765	0.89777	0.89777
1970	21	1	126.172	0.40792	0.89777	0.89777
1971	22	1	146.255	0.43136	0.89777	0.89777
1972	23	1	123.903	1.00445	0.89777	0.89777
1973	24	1	130.334	1.34915	0.89777	0.89777
1974	25	1	117.000	0.24702	0.89777	0.89777
1975	26	1	127.684	0.07237	0.89777	0.89777
1976	27	1	126.145	0.54544	0.89777	0.89777
1977	28	1	134.652	0.44335	0.89777	0.89777
1978	29	1	130.738	0.99491	0.89777	0.89777
1979	30	1	125.377	0.61690	0.89777	0.89777
1980	31	1	130.001	0.40395	0.89777	0.89777
1981	32	1	.	.	.	.
1982	33	1	123.238	0.61973	0.89777	0.89777
1983	34	1	113.333	0.80140	0.89777	0.89777
1984	1	0	150.809	0.44177	0.89777	0.89777
1985	2	0	145.933	0.34714	0.89777	0.89777
1986	3	0	114.432	0.20149	0.89777	0.89777
1987	4	0	100.022	0.32225	0.89777	0.89777
1988	5	0	126.825	0.77750	0.89777	0.89777
1989	6	0	114.084	0.63727	0.89777	0.89777
1990	7	0	132.455	1.42050	0.89777	0.89777
1991	8	0	119.406	0.77303	0.89777	0.89777
1992	9	0	119.406	0.64474	0.89777	0.89777
1993	10	0	124.424	1.09567	0.89777	0.89777
1994	11	0	132.754	1.12044	0.89777	0.89777
1995	12	0	121.425	0.54356	0.89777	0.89777
1996	13	0	125.550	0.79941	0.89777	0.89777
1997	14	0	128.649	0.45358	0.89777	0.89777
1998	15	0	135.489	0.85358	0.89777	0.89777
1999	16	0	111.075	0.49105	0.89777	0.89777
2000	17	0	129.420	1.24094	0.89777	0.89777
2001	18	0	146.509	0.82714	0.89777	0.89777
2002	19	0	123.238	0.94695	0.89777	0.89777
2003	20	0	134.035	0.79052	0.89777	0.89777
2004	21	0	114.544	0.54903	0.89777	0.89777
2005	22	0	129.380	0.54275	0.89777	0.89777
2006	23	0	127.325	0.16573	0.89777	0.89777
2007	24	0	120.657	0.55113	0.89777	0.89777
2008	25	0	132.340	0.37966	0.89777	0.89777
2009	26	0	126.624	0.93210	0.89777	0.89777
2010	27	0	127.472	0.75734	0.89777	0.89777
2011	28	0	.	0.52926	0.89777	0.89777
2012	29	0	.	.	.	.
2013	30	0	117.104	1.30913	0.89777	0.89777
2014	31	0	108.474	1.14519	0.89777	0.89777
2015	32	0	132.423	0.87267	0.89777	0.89777
2016	33	0	133.205	1.32545	0.89777	0.89777
2017	34	0	136.909	0.50451	0.89777	0.89777
2018	1	0	.	.	.	.
2019	2	0	117.104	1.30913	0.89777	0.89777
2020	3	0	108.474	1.14519	0.89777	0.89777
2021	4	0	132.423	0.87267	0.89777	0.89777
2022	5	0	133.205	1.32545	0.89777	0.89777
2023	6	0	136.909	0.50451	0.89777	0.89777
2024	7	0	.	.	.	.
2025	8	0	117.104	1.30913	0.89777	0.89777
2026	9	0	108.474	1.14519	0.89777	0.89777
2027	10	0	132.423	0.87267	0.89777	0.89777
2028	11	0	133.205	1.32545	0.89777	0.89777
2029	12	0	136.909	0.50451	0.89777	0.89777
2030	13	0	.	.	.	.
2031	14	0	117.104	1.30913	0.89777	0.89777
2032	15	0	108.474	1.14519	0.89777	0.89777
2033	16	0	132.423	0.87267	0.89777	0.89777
2034	17	0	133.205	1.32545	0.89777	0.89777
2035	18	0	136.909	0.50451	0.89777	0.89777
2036	19	0	.	.	.	.
2037	20	0	117.104	1.30913	0.89777	0.89777
2038	21	0	108.474	1.14519	0.89777	0.89777
2039	22	0	132.423	0.87267	0.89777	0.89777
2040	23	0	133.205	1.32545	0.89777	0.89777
2041	24	0	136.909	0.50451	0.89777	0.89777
2042	25	0	.	.	.	.
2043	26	0	117.104	1.30913	0.89777	0.89777
2044	27	0	108.474	1.14519	0.89777	0.89777
2045	28	0	132.423	0.87267	0.89777	0.89777
2046	29	0	133.205	1.32545	0.89777	0.89777
2047	30	0	136.909	0.50451	0.89777	0.89777

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ONS	YEAR	TYPE	DI	EB	W7	ETP7
245	1956	7	0	133.436	0.88076	0.95426
246	1957	8	0	120.737	0.88779	1.00000
247	1958	9	0	135.116	0.85442	0.90881
248	1959	10	0	128.782	0.52104	0.97101
249	1960	11	0	112.028	0.58503	0.97246
250	1961	12	0	116.671	1.24249	1.00000
251	1962	13	0	117.003	1.48044	1.00000
252	1963	14	0	125.691	0.83019	0.93300
253	1964	15	0	126.251	0.24406	0.91634
254	1965	16	0	120.627	0.55382	0.89853
255	1966	17	0	125.847	0.69265	0.98618
256	1967	18	0	126.579	0.30107	0.94592
257	1968	19	0	126.579	0.74052	1.00000
258	1969	20	0	101.362	0.73949	0.99167
259	1970	21	0	128.047	0.94091	0.99571
260	1971	22	0	143.617	0.69332	0.97074
261	1972	23	0	115.137	1.27204	1.00000
262	1973	24	0	132.039	0.44184	0.93614
263	1974	25	0	110.622	0.53676	0.97051
264	1975	26	0	122.869	0.28202	0.87650
265	1976	27	0	119.244	0.47338	0.81045
266	1977	28	0	105.792	1.23993	1.00000
267	1978	29	0	123.652	0.82359	1.00000
268	1979	30	0	121.465	6.92529	0.99304
269	1980	31	0	120.737	0.45386	0.95610
270	1981	32	0	...	...	...
271	1982	33	0	...	...	...
272	1983	34	0	...	...	...